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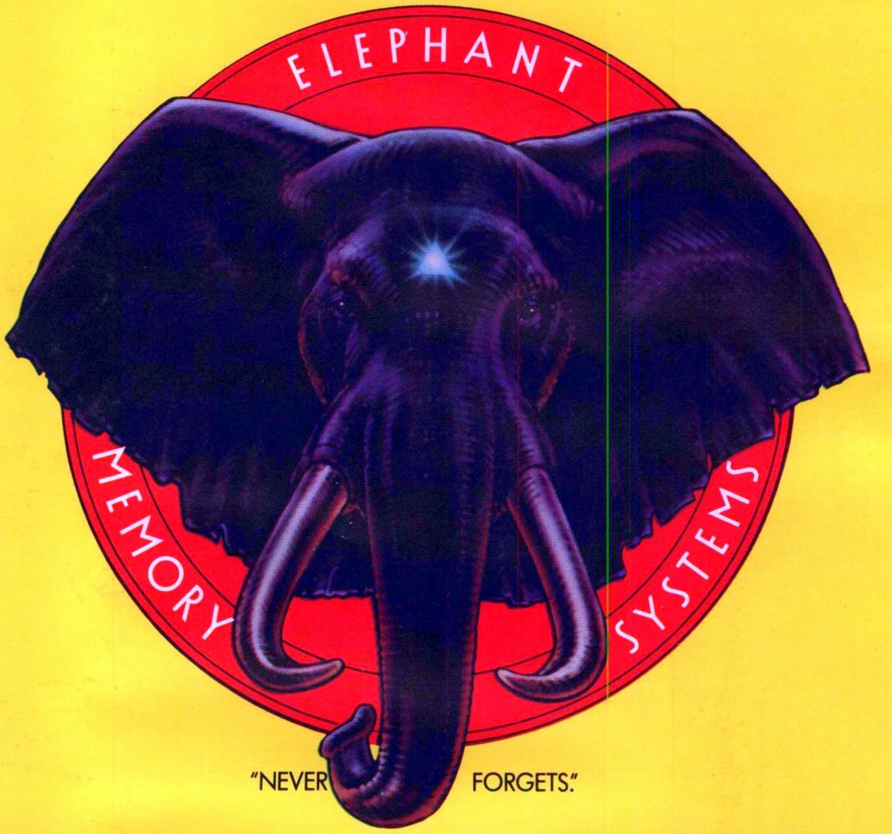

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THE EDITOR BYTES BACK

the editor

IT looks like the Apple //e is gonna come out a winner. From all reports we have received, it is selling like the proverbial hotcakes, and we intend to give it full coverage as material becomes available. In the way of a sneak preview, look for a way to use the Extended Text Card in double-wide **Low-Res** graphics, something Apple doesn't tell you about in their manual. We hope to make the Julyish with this'n.

Meantime, back at the editor's desk, we're leading off this issue with **Comparing Apples and Apples,** a users look at the respective monitors of the Apple][Plus and the Apple //e, presented for your edification by **Cecil Fretwell.**

Holding down second spot on the cover is a comparitive review by our own **Steve Ross,** head of **Software Product Development** for A.P.P.L.E., of several of the currently available spreadsheet type programs. If Steve seems a tad biased, we can't blame him too much, since he wrote the documentation for our **THE Spreadsheet 2.0.** All in all, though, we think it's a purty honest evaluation.

A couple issues back, staffer **Dave Sparks** did a comparitive review on several ampersand utilities. Now comes another staffer, **Bill Parker,** with a handy-dandy utility, **Creating an Amper-Library,** which tells you how to build your own "front end" for those dozens of neat ampersand routines that all require use of the $3F5 (1013) ampersand jump vector

An Apple for the Teacher is the overall title for our new educational column which commences this month. To start it off with a bang, we have put together a whole glunch of education features, including **Mike Shadick's The Arcadian Approach.** This whole section is the brainchild of associate editor **Kathryn Hallgrimson Suther,** who also reviews **Kids and the Apple.**

We have two additional columns to introduce in this issue, **Rick Sutcliffe's Northern Spy,** a conglomerate of north-of-the-border news, programming hints, reviews and miscellany, and for CP/M buffs, **Murray Arnow's CP/Magic** will fill a much needed gap as he discloses some of the Apple-CP/M information he has unearthed.

For those of you who dare invade Apple's internals, **Damon Slye** offers a peek (pun intended) at **Fast 6502 Multiplication.** If speed is what you need, Damon's got just the thing . . .

Continued on page 32

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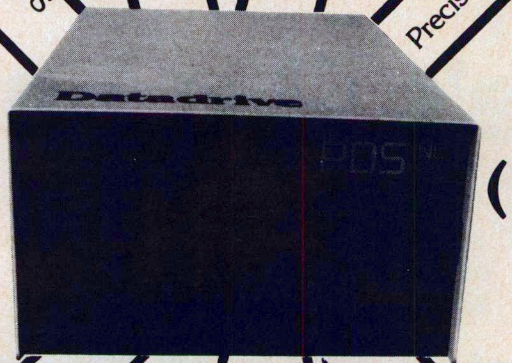

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BYTES FROM A.P.P.L.E.

Val J. Golding

THE Spreadsheet, Version 1.0 is now a collector's item. It was withdrawn from the market in December, 1982 as we were unable to renew our agreement to produce it. For those of you who got one of the 1200 odd copies, we suspect, considering the stature of the authors' names, it may turn out to eventually have considerable value. At the Anaheim Applefest, A.P.P.L.E. president *Dick Hubert* suggested to one member that he hunt down the Woz *(Steve Wozniak)* and ask him to autograph his original THE Spreadsheet. Woz, who was in attendance, graciously complied. All of this is sort of a "shaggy dog" lead in to let you know we now have available, at only $5, **THE Spreadsheet Converter.** This program will convert version 1.0 files to version 2.0 format.

We have just taken delivery of an IBM (what was that word?) System 38 computer. This is going to be a real boost to us in getting your orders to you sooner. We'll be writing more about if after we get it on line. In the meantime we have introduced product codes that the 38 will understand; their use right now will also help us expedite processing and delivery, so please look at our order form and have the new codes ready when you phone or mail an order.

June brings us summertime; summertime brings us those nice warm days we yearned for in February; summer's warmth also brings heating problems to our Apples. These problems can be particularly significant if your Apple is loaded with cards and/or you are using an 80–column card, probably the biggest single power draw on the Apple. Fortunately, we also have the cure for the overheat blues — a kit consisting of fan, linecord and mounting tape. We have been selling the Ap.Cool-Kit for over a year now at a special member price of $22.50. Now through August 31st, you can order this at only $17.50. The new product code is HAKK. Hear ye, hear ye, let this be known as the **Summer Cooling Special.**

Having now taken care of hardware, we have two related specials, one for publications and one for software. At the recent Anaheim Applefest we introduced issue 3 of *Call –A.P.P.L.E. In Depth: All About DOS,* which was extremely well received (in fact we had to airfreight more copies from Seattle). For those of you who are not familiar with *Call –A.P.P.L.E. In Depth,* this is our second magazine, a unique blend of technical articles, reference manual and introduction to the subject. Approximately 25% of the content is reprinted or expanded from the monthly *Call –A.P.P.L.E.*, while the balance is new material, much of it specially commissioned.

Here are details of how you can save up to $18 on these two specials. **In Depth Magazine Special:** regular member price for *All About Applesoft, All About Pascal* and *All About DOS* is $31.50, price for the special is $25. **In Depth Diskette Special:** six diskettes containing the programs published in the three In Depth issues, regular member price is $51.50, price for the special is just $40. Their respective product codes are PS10 and SSIN.

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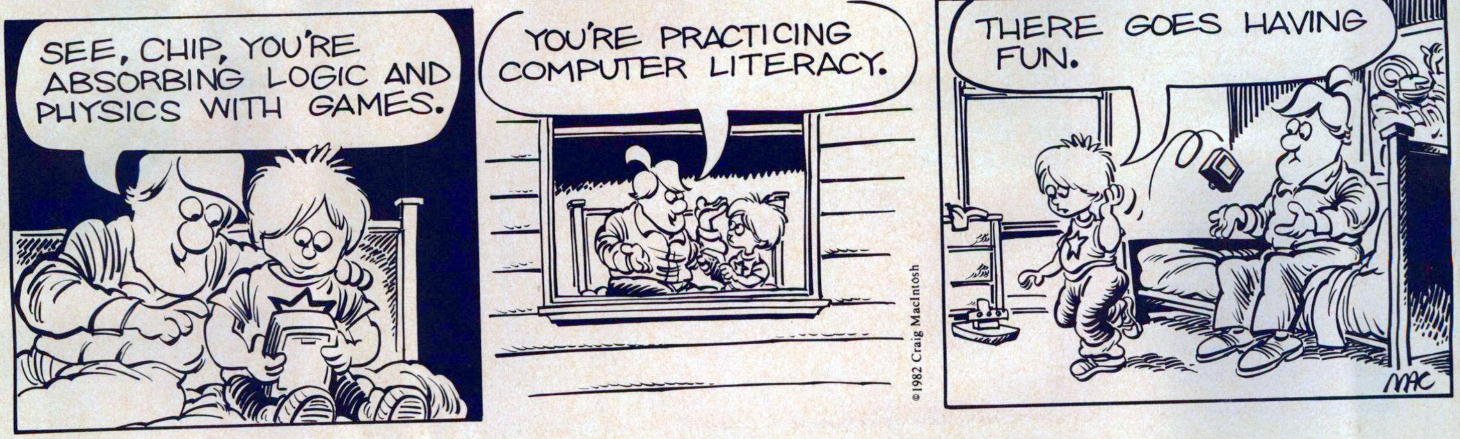
BOOT

Craig MacIntosh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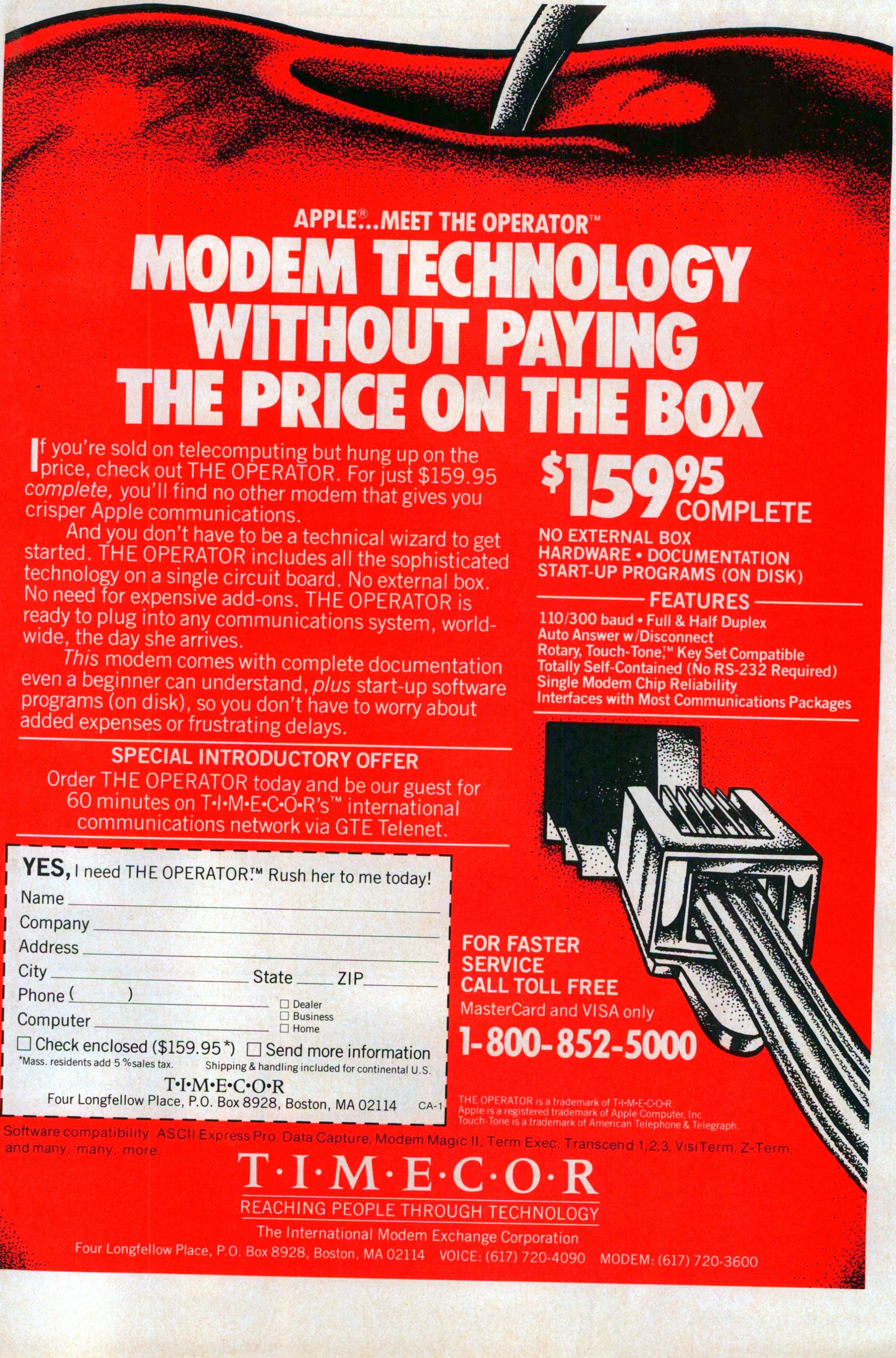

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THE //e AND THE PLUS:

Comparing Apples and Apples

Cecil Fretwell

EVEN though I have been in the computer business for some 23 years and have had my own home-brew systems for years, I am a late-comer into the Wonderful World of Apple. This turned out to be not all bad, because my dealer let me trade my][+ for the new *IIe*, a decision I don't think I will regret. For one thing, it allows me to compare the new to the old.

My][+ had 48K of RAM, 16K language card, the Videx 80 column board and the Super Serial card to drive my TI 820 printer. I had no complaints about this system, including the 80 column board.

The *IIe* I traded for naturally came with the full 64K of RAM. I also have the new Apple 80 column board without the extended memory option. The Super Serial card migrated to the new system with no changes required. The only thing I had to "eat" was the VIDEX 80 column board and Applewriter II with the VIDEX pre-boot disk. I am hoping I can sell the excellent VIDEX board and Applewriter II with the VIDEX disk for at least the amount I had to pay to trade for the *IIe*.

The "e" of Apple //e means enhanced . . .

Since the two systems I have just described are supposed to be equivalent, I can make some good observations as you will see. The e on the end of the *IIe* means enhanced, according to Apple Computer, a fact that appears to be true. Only time will prove my opinion that very few programs written for 40 column mode will migrate from the][+ to the *IIe* without any major problems. I can't say the same for 80 column mode as will be seen later in this article.

Let's start our discussion by taking the system out of the box or, in some cases, view it for the first time at the dealer. Since I work a lot with CRT's like the DEC VT100, Televideo 950, etc., I was immediately impressed with the new keyboard. It is very professional in that the keys are located "where they should be." It would take several paragraphs to substantiate this statement, therefore, in the interest of brevity I will mention only a few features.

I was immediately impressed with the new keyboard.

The old ESC key position is now the TAB key, a key which produces [Ctrl–I]. The ESC key has been moved to the numeric row where it belongs. Things like : and ; are where they belong in the "home" row for touch typists. In general, I find the keyboard to not only look like most CRT keyboards, but also, like the keyboard on a standard typewriter. Even though I am used to a standard CRT keyboard, it took me a few days to "forget" where the old][+ keys were.

I really like the feel of the *IIe* keyboard. It takes far less pressure to press a key as compared to the][+ keyboard. Being a fast touch typist, I always had problems with such things as not pressing the space bar hard enough on the old keyboard. The new keyboard also has the typamatic feature, i.e., holding down a key for more than a second causes the key to be repeated on the screen. In other words the old REPT key (a carryover from the old Teletype days) is gone.

I also discovered that the electronics of the keyboard has been cleaned up. On the old system I used my standard habit of rolling my fingers across ASDF to produce a test string. Being fast in this process, I always got ASDF2, that is no longer true. In fact, the *IIe* has the true N key rollover feature, *e.g.,* if you are fast enough and have enough fingers, you can press and hold down the A key, then press and hold down the B key, etc. No matter how many keys you hold down, you always get the last key you hold down.

The next comment regarding the keyboard is not really a complaint. Apple placed a little raised dot on the D, K, and right arrow key. The idea is good to help one locate the "home" row. I may take a *knife and* "grind" them off if I can not learn to ignore the distraction they now produce for me.

The last comment regarding the keyboard involves the new open and closed Apple keys and the RESET key. First of all, the RESET key is really depressed and absolutely requires the use of the CONTROL key (the old CTRL key). An old danger using the RESET key has been all but removed.

A great improvement was the addition of the open and closed Apple keys.

A real great improvement was the features added by the open and closed Apple keys. If one holds down CONTROL, open Apple, and RESET simultaneously, the system performs a re–boot. Even though I run my system through a power strip to preserve the power switch on the Apple, this avoids the occasional problem of having to power down and power up the Apple if the system totally dies. This is not due to a hardware failure but due to a "short circuit" between the ears.

COMPARING APPLES AND APPLES

If one holds down CONTROL, closed Apple, and RESET simultaneously, the system performs a self test on its electronics. Having a brother who is an electrical engineer and designed my pre–Apple systems with me doing the software, when a problem arose, he claimed it was software and I claimed it was hardware. This new Apple feature might settle such an issue. The feature definitely becomes more useful as the *IIe* ages. It might avoid a trip to the dealer if one suspects the Apple has gone flaky.

Enough on the keyboard. In preparation for installing the disk controller board and the Super Serial card, both from my old][+, the next logical step was to pop the cover off the system. Incidentally, the physical shape of the "box" for the keyboard, etc. has not changed.

. . . the motherboard looks like the Sahara desert compared to the][+.

The first thing one notices with the cover off is that the motherboard looks like the Sahara desert compared to the][+ motherboard. 48K of RAM used to be in a space about 4" by 10." Now 64K is on eight chips in an area about 1" by 6." A special memory management chip has also replaced a lot of the][+ chips. The end result is that the *IIe* should run a lot cooler. Before I traded my old][+ with its language card and the VIDEX board, I was about ready to buy a fan because there were occasions when I felt that heat was causing a problem.

The next thing one notices is the vast improvement in the "holes" to run cables out to the disk drives, etc. Apple has dreamed up holes that should cover any kind of connector available, with the end result of a clean looking backside.

Installing the disk cables through the holes was not easy for me. I have always had troubles with little screws and working in tight places. Being a smart aleck, I did not follow Apple's suggestion and have the holes facing me when I installed the disk cables. Even though Apple provides a small wrench to tighten the screws, I suggest that one invest in a nut driver set; it made my job easier.

Installing the Super Serial card was a breeze as was the 80 column board. The most impressive thing about the 80 column board without the 64K memory expansion is that it has only five chips and you can hold it in the palm of your hand.

The installation process requires using the manuals, a fact not unique to Apple. I have not completely read through the manuals, however, I was immediately impressed with their format, etc. The old manuals were good but look like kindergarden stuff when compared with the very professional looking new manuals. Their contents are still geared to cover all levels of experience.

All the time, the overpowering urge was to fire up the system and see what it does. Even though I spent some four hours on the dealer's *IIe* before I decided to trade, the biggest question I wanted answered was how much of my old][+ software worked without changes on the *IIe*.

Although I did not try it on the dealer's *IIe*, the first thing I did was boot up the disk supplied by Apple called Apple Presents. . . Apple. It takes about 20 minutes for an experienced user to go through the tutorial presented by the disk. Even if an experienced user purchases the *IIe*, I strongly suggest that they fire this disk up first. It told me a lot about the *IIe* and saved me a lot of time compared to taking the manual route. It is excellently done and even provides some humor such as "A computer genius is one who knows 19.3 times more about computers than their colleagues." Having had a hard day at the office, this disk put me in a good frame of mind for the rest of the evening.

I ran several tests and need to run more to convince myself that as long as one works in 40 column mode, the][+ programs migrate to the *IIe* with no changes required. I still need to investigate the 80 column mode in more detail, because I suspect the migration may not be so simple.

I have A.P.P.L.E.'s *Big Mac.LC* which I have used to write a lot of assembly language stuff. Nothing changed to include the use of the printer and the special driver I wrote for my printer.

The next test was to try some programs my wife and I have written and will soon offer for sale in the genealogy area. These programs use a combination of Applesoft Basic and assembly language programs. Again no problems. In fact, the new 40 column cursor, being a block of discrete dots compared to the old solid block, is much more pleasing to the eye for our application.

Having passed these two crucial tests, one of which showed me the operation of the "language card" has not changed, I then tested a game we copied from a friend and one which involves graphics. It also worked with no problem.

. . . the major ROM entry points have not changed.

At this point, I stopped my tests and turned my attention to technical aspects for the purpose of determining what are the potential impacts of switching from a][+ to a *IIe*. Before I traded my][+, I had used Big Mac's SOURCEROR to obtain a source of the][+ Autostart ROM. I assembled it on the *IIe*, loaded the object into $800, and used the ROM monitor to run a compare out to my printer. What follows is a cursory look at what I found.

The region $F800 to $FFFF showed 145 bytes changed. Although it would take more time, one can verify what I say here by wading through the Monitor ROM Listings Manual I had to purchase. In these listings, which include the 80 Column card code, the old Autostart ROM code falls out in an obvious manner because Apple used a conditional psuedo op which shows both the *IIe* code and the][+ code.

The differences appear to be as follows. Please understand that I have not gone through these differences in depth, so if I make a mistake, I apologize. An overall glance at the differences show all of the major ROM entry points to things like HOME, RESET, clear to end of line (CALL –868), CALL –151 to get to the ROM monitor, etc. *Have not changed.* I never cease to find it amazing that migrating from the old Monitor ROM to the old Autostart ROM to the new Autostart ROM and migrating through the various levels of DOS rarely creates problems for the ordinary user. It has to be one of the keys to the success of Apple.

Locations $FA75–$FA7A have changed. This is in the RESET code starting at $FA62. The new code uses some code which resides in the $C100 region of the 80 column card. The start of this code involves a new subroutine called GOTOCX starting at Location $FBB4. GOTOCX is a subroutine which is entered with a function code in Register Y. In glancing through the well commented code at $C100, it looks like the system is set up to allow for the absence or presence of the Apple 80 column card and takes into account the status of Slot 3 on the motherboard.

Locations $FB0A–$FB0D have changed. Since the Apple 80 column card supports lower case in 40 column mode, when the system performs a boot, the old APPLE][display has been changed to Apple][.

Locations $FB51–$FB54 have changed. This is in the SETWND code. It causes similar gyrations to be performed as was the case with the RESET code. It basically replaces the old code with a JSR GOTOCX and a NOP.

Location $FBA2 has been changed from a JSR RDKEY to a JSR RDESC. The label RDESC happens to be at the old KEYIN2 location. This JSR is in the ESCNOW logic. More will be said about this later.

Locations $FBB3–$FBC0 used to contain all NOPs. Some of these NOPs have been replaced with the GOTOCX code. $FBB3 contains a value $06 and is labeled VERSION. The comment associated with VERSION says FOR IDCHECK, so one would assume it has some future purpose.

. . . a nice article . . . could be developed around the Apple 80 column board.

To digress for a minute, a nice article by someone, maybe me if I do it first, could be developed around the Apple 80 column board. It has a lot of power that I still have not dug into. It is going to take some understanding to use its full power.

Locations $FC42–$FC61 have changed. $FC42 is still the entry point to CLREOP which is the clear to end of screen logic and $FC58 is still the entry point to HOME. By means of a function code, the GOTOCX subroutine is used to perform the desired function. They had so much space left in this patching process that they could place the ASCII string "(C) 1981–82, Apple" in locations $FC46–$FC57. One of the authors of the changes was Rick Auricchio, so he undoubtedly placed the string "RICK A" in locations $FC5C–$FC61".

Locations $FC70–$FC9B have changed. $FC70 is still the entry point to the SCROLL logic. All it does is set a function code in Y and transfer control to the GOTOCX subroutine. This means that the old logic in the range $FC75–$FC9B is gone and one who references the old labels SCRL1, SCRL2, and SCRL3, has problems. This range now has a new subroutine which is called IRQ SNIFFER FOR VIDEO CODE.

Locations $FC9C–$FCA7 have changed. $FC9C is still the entry point to the CLREOL logic and $FC9E is still the entry point to the CLREOLZ logic. One who references the old label CLEOL2 has problems because this location is now the operand of the STY $1F instruction.

Locations $FD1B–$FD20 have changed. $FD1B is still the entry point to KEYIN. The new logic establishes a function code in Register Y then transfers control to GOTOCX. In this process, the updating of the random number in $4E and $4F has been retained. KEYIN does not fall through to the next subroutine like it did in the old code.

Locations $FD21–$FD2E have changed. The old KEYIN2 code in this area has changed. $FD21 is now a new subroutine called RDESC. It establishes a function code in Register Y then transfers control to GOTOCX. $FD29–$FD2E contains code that has the RETURN FROM GOTOCX HERE comment.

This code probably explains why I thought I had a problem with the ESC key. On the *IIe* one can still use the ESC I, J, K, M idea to move the cursor around as before. Apple made this a little neater by using ESC and the four arrow keys, left, right, up, down to perform the same function as I, J, K, M. For example, ESC then repeated use of the up arrow key and is the same as repeated use of the I key. The only major change in this concept is that on the][+, one could exit the ESC mode by using the right arrow key, a common habit I developed. Not true on the *IIe* because the right arrow is still active in ESC mode. I knew there had to be a reason why the old manuals suggested always using the space bar to exit ESC mode.

Location $FD2F still remains the entry point to the ESC logic. The JSR RDKEY was changed to JSR RDESC which was discussed above. This is the change that no doubt brings the arrow keys into play in ESC mode.

The STA INVFLG at location $FD42 has been changed to NOPs. This is the NOTCR logic starting at $FD3D. The old comment was CONVERT TYPED CHARACTER TO NORMAL. I suspect this change is related to the new format of the cursor in 40 character mode.

The AND #$DF at location $FD82 has been changed to AND #$FF. The old Autostart ROM used to change lower case input to upper case input in the GETLN logic. This change negates this feature. Until a new DOS comes out that hopefully allows both upper case and lower case commands, this means that the CAPS LOCK key must be down when under DOS control, or one drives themselves silly using the SHIFT key.

The last difference was found in locations $FEC5–$FEC9. The other author of the changes was Bryan Stearns, so he placed the string "Bryan" in these locations which formerly held NOPs.

COMPARING APPLES AND APPLES

This exercise took some time, but it did give me more confidence in the fact that the *IIe* Autostart ROM should present no major problems when using programs that referred to the old Autostart ROM. To round out some of my concerns about the *IIe* versus the][+ software, I then loaded FPBASIC from the SYSTEM MASTER into $800. Before I traded my][+ I wish I had made a copy of $D000–$FFFF on a disk. Anyway, I used the ROM monitor to compare the Applesoft Basic in the *IIe* ROMs to the FPBASIC on disk. I found only one difference at $F7FF. The *IIe* ROM contains $78 and the FPBASIC contains $D7 in this same location. I have no idea what this difference means. It represents the last of three unused bytes at the end of Applesoft so I don't think there are any problems with Applesoft.

. . . one can expect problems in 80 column mode.

At this point, I have not performed many tests using the Apple 80 column logic. It works fine when one is listing Applesoft programs and running what few programs I have written that use 80 columns. Because of the variety of 80 column boards like the VIDEX for the][+, one can expect problems in 80 column mode. I already know that Big Mac.LC bombs in edit mode when the E command is used. GPLE blows its mind also. A.P.P.L.E. was already aware of it when I talked to Val on the hot line. A disk and $5 will fix the Big Mac problem, not so simple on GPLE which Val tells me will take some time.

The last topic I want to discuss is Applewriter II. Part of the package when I purchased my][+ was Applewriter. I think I would have purchased it anyway, because the preparation of this article is just one example of the many ways I use it. I will go into only a brief overview here.

At the dealer, I tried the old Applewriter II on the *IIe*. In 40 column mode, there is no problem, however, one cannot use the lower case feature of the new 40 column mode on the Apple 80 column card. I was not surprised when 80 column mode wouldn't work, nor was I surprised when the VIDEX pre–boot board generated a good laugh. So I forked over $200 and bought the new Applewriter II for the *IIe*. It is one of the reasons why I can't live without 80 column mode.

The Applewriter II for the *IIe* contains some vast improvements. Paul Lutus has provided a more professional package with some loss in memory available for text. My biggest complaint about the old version was that when one moved the cursor into the text, it took up a space between letters. This presented some problems, for example, in trying to align some columnized text, or knowing whether the cursor was setting on a space at the end of a line with word wraparound in effect. In the new version, the cursor "sits" on top of a character in text.

Another good feature makes heavy use of the arrow keys in a more logical manner. The left, right, up, and down keys move the cursor around on the screen. They replaced the old ESC I, J, K, M feature. ESC now causes a toggle of the top line of the screen. Instead of using the left arrow to delete characters, the DELETE key now performs this function. The right arrow key no longer performs a copy function.

Some of the "removed" functions involving the arrow keys in the old version have been retained by using the open and closed Apple keys. These keys also provide other useful functions. Even though entering this article represented my first major use of the new version, I had to make few references to the new manual. In other words, one does not have to learn Applewriter all over again. I highly recommend Applewriter for both the][+ and the *IIe*.

This concludes my initial observations of the *IIe* versus the][+. I had absolutely no major complaints about my old][+. I just knew that when I finished my playing around at the dealer I would be a complete fool not to trade for the *IIe*. Now I am waiting for the new high density drives that I have heard Apple plans to introduce.

ODE TO APPLE //e

From the Apple][and][+ somewhere in Dayton Ohio

Oh! Apple //e,
I hate you for dating me,
I had my forty lines,
Now you have eighty lines,

You no longer require the GET,
With your full ASCII Set,
And with your IOU and MMU,
You sneer at the][,

Integrated EC's is what you got,
Now I am much too hot,
You e are unfettered,
I have seen your little lettered,

Yes e, you are so cool,
Reset is no problem as a rule,
And your Graphics are so clear,
Sweet little e dear,

With goodies you are replete,
Me, I'm obsolete,
Certainly! I mind,
You even have a prettier behind,

You are nice I admit,
But let me say before I quit,
There are things that I can do,
That are unavailable to you,

I can at places PEEK,
That you can only SEEK,
And places I can POKE,
Will cause you to CHOKE.

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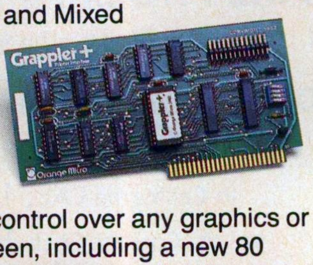

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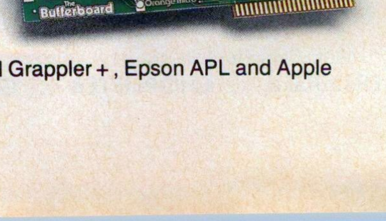

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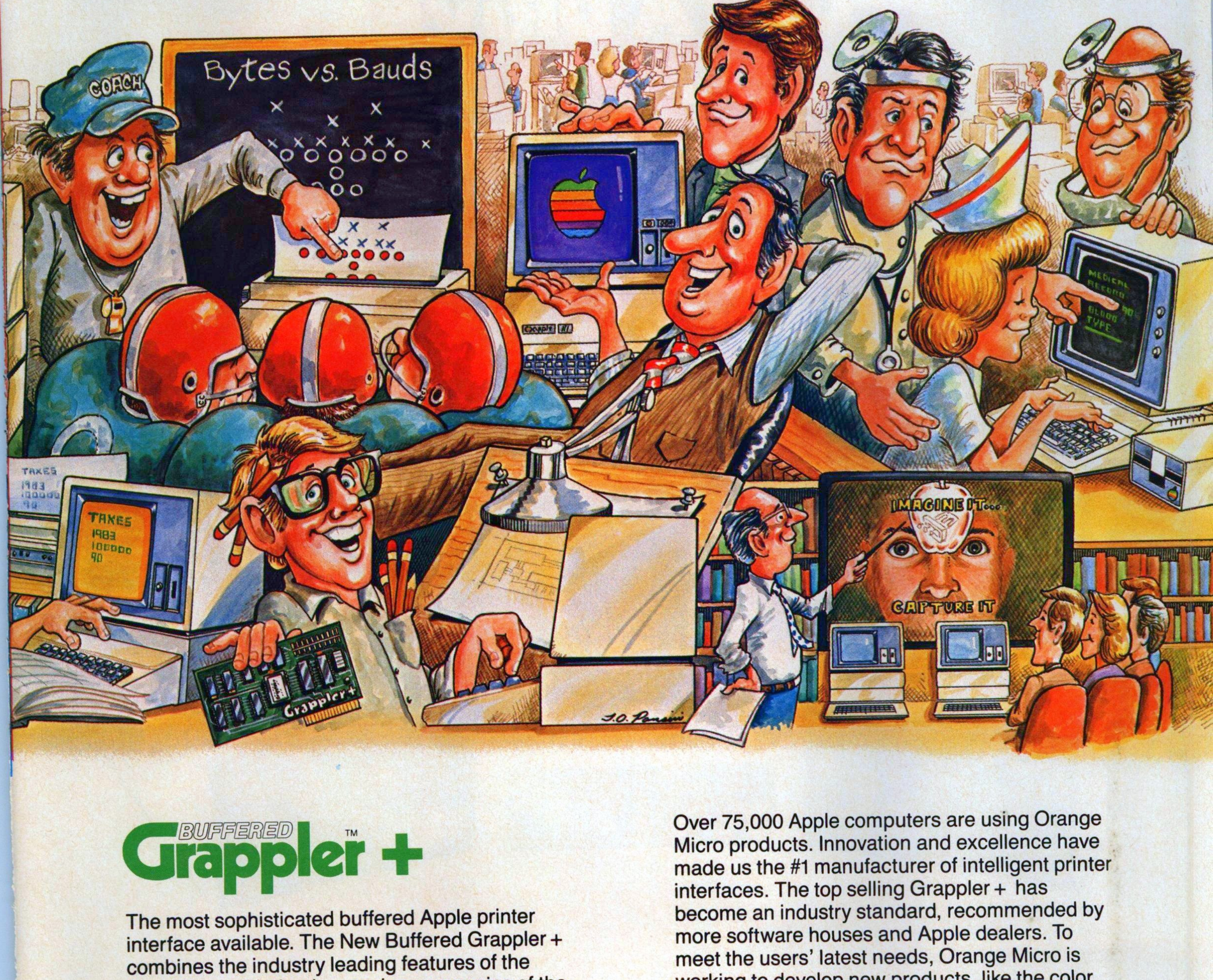

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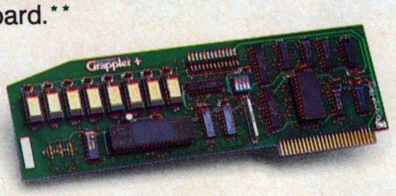

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Introduction

A.P.P.L.E. has offered two spreadsheet calculator programs in the last eight months, and we are often asked questions about how our program compares with other programs available on the commercial market. Since the release of THE Spreadsheet (Ver. 2.0), we find ourselves answering these questions, and we are also asked how the new version of THE Spreadsheet compares with the old one. This article will attempt to provide some of the answers.

I have chosen to limit the scope of my discussion to spreadsheet calculator programs that run on the Apple][, either in native mode (6502 machine code) or in CP/M (on a Z-80 card). The reason for this limitation is that if the Apple ///, and other mid-range computers are included, certain comparisons are not meaningful because the hardware architecture (specifically the CPU speed and maximum available memory) is different from machine to machine. This limitation, while it provides for a more uniform base of comparison, precludes the evaluation of such packages of VisiCalc — Advanced Version, which is not available yet on the Apple][.

Before I begin, I should mention that I adapted the document for THE Spreadsheet (Ver. 1.0), and wrote the document for THE Spreadsheet (Ver. 2.0). THE Spreadsheet (Ver. 2.0) is a totally new program from THE Spreadsheet (Ver. 1.0); different authors, and new, comprehensive, user-oriented documentation.

Electronic Spreadsheet Calculator Programs

Electronic spreadsheet modeling became popular as the result of the efforts of two programmers and their Apple][. The result of their work: VisiCalc™. Since the widespread acceptance of the spreadsheet modeling idea, there have been many "Visi-Clones," or "Calc-Alikes" offered in the Apple][market. Each of these programs has some different features, but most of the basic features are identical (even down to the command structures!).

A question one has to ask is "why are there so many spreadsheets?" The primary answer is simple: they sell well. The other issues, however, are less obvious. This article will discuss some of the more important features of the spreadsheet calculator, and how various implementations compare with each other.

Speed

The most important feature of electronic spreadsheets is the true interactive capability they provide; you see your changes immediately reflected on the screen. As a direct result, speed is a primary consideration. If you have to wait an inordinately long period of time to get a recalculation, your productivity goes down, and that's precisely what you were setting out to enhance.

Obtaining a good benchmark on the speed of a spreadsheet program is a very difficult proposition because some are strong in one type of arithmetic, where another might be strong in another area. Some do not update the screen quickly, and others require portions of the program to be brought in from disk every time they are used. Here is a table (empirically derived) of the speed considerations of several spreadsheet programs: In this and each of the following tables, the programs are ranked in order, with 1 representing the highest.

Raw Recalculation Speed

1) THE Spreadsheet (Ver. 2.0)
2) THE Spreadsheet (Ver. 1.0)[1]
3) VisiCalc
4) SuperCalc
5) Multiplan[2]
6) CalcStar

The first three are all extremely quick, and may be able to beat another in the group under the correct circumstances. CP/M-based SuperCalc is noticeably slower when running on the Microsoft Z-80 Softcard. Multiplan takes a significant amount of time to accomplish a recalculation on a model of any size, which can be very annoying, especially when entering data. CalcStar (again, in the CP/M environment) seems to take the longest of the group.

Screen Update Speed — 40 Column

1) VisiCalc
2) THE Spreadsheet (Ver. 1.0)
3) THE Spreadsheet (Ver. 2.0)
4) Multiplan

(SuperCalc and CalcStar do not run well in 40 columns)

VisiCalc is extremely quick at updating the 40 column screen. Both Spreadsheets are fast, and there should be virtually no perceptible difference between the response of the top three. Multiplan, probably because of the extensive formatting capabilities, services the screen more slowly. Multiplan's effectiveness is severely compromised by running in 40 column mode because of the windowing, formatting, and prompt capabilities.

Screen Update Speed — 80 Columns

1) THE Spreadsheet (Ver. 2.0)
2) SuperCalc
3) Multiplan
4) CalcStar
5) VisiCalc (with pre-boot disk)[3]

(no 80 column mode available for THE Spreadsheet (Ver. 1.0)

In 80 columns on the Apple][, we are presented with a new problem: how the program supports peripherals. THE Spreadsheet (Ver. 2.0) is by far the most flexible, and will allow you to write your own video drivers if necessary. SuperCalc uses the CP/M BIOS to handle screen updating, and is reasonably good. Multiplan, again due to its extensive formatting capabilities, is noticeably slower at "painting" the screen. CalcStar, in the Apple][implementation, seemed a bit slower than Multiplan. VisiCalc came in last, and I think the reason is that it simply was never intended to run in 80 columns.

There is a problem with comparing 80 column screen update speed; various cards are faster than others. I used a Videx Videoterm for all tests.

Disk Accessing

THE Spreadsheet (Ver. 1.0):	None.
THE Spreadsheet (Ver. 2.0):	Only to load drivers for printers or video boards (one time only).
VisiCalc:	None.
SuperCalc:	Online Help Menus.
Multiplan:	Program overlaying is sometimes an annoying delay.
CalcStar:	Online Help Menus.

Speed of Loading a Model

This is one of the most frustrating speed concerns, because when you call in a model from disk, presumably you have some work you want to do with it immediately. If it takes a great deal of time to load the model, you may lose the thread of thought that originally inspired you to work with the model.

1) THE Spreadsheet (Ver. 1.0)
2) THE Spreadsheet (Ver. 2.0)
3) SuperCalc
4) Multiplan
5) VisiCalc
6) CalcStar

Again, as with almost all of these tables, there is a certain amount of variance in the performance of these packages from model to model, but THE Spreadsheet (Ver. 1.0) comes out a clear winner in terms of speed of model load. THE Spreadsheet (Ver. 2.0) is very close behind, and as will be discussed later, has the facility to support hard disk storage which can change the outcome of the tests drastically. SuperCalc is acceptable, but it seems to do a great deal of looking around on the disk, and it issues many prompts to load a file. After you become experienced in using a program, the prompts become an annoyance. Multiplan has to do a great deal of legwork to load a file because of the linked worksheet capability. In the case of a simple model, you pay for this at load time. VisiCalc comes out the slowest of all the spreadsheet programs. It just seems to take forever, and the feedback to the user is minimal (a blinking asterisk).

Usable Matrix Size

As people progressed from 32K Apples to 48K, and on to 64K configurations, they have realized jumps in what I call "usable matrix size." Most spreadsheet programs have a fixed size matrix. For example, VisiCalc, and both Spreadsheets are 63 columns by 254 rows. Unfortunately, the memory of the Apple fills up long before the matrix does. Why, then, have a matrix so large? Long, narrow models, and short, wide ones are far more common than perfectly square models.

Still, even with a 64K configuration (standard on the Apple *II*e), there is not enough room for some large models. This has been such a common complaint from avid VisiCalc users that pre-boot disks have been designed to allow VisiCalc to take advantage of extra RAM on an expanded RAM card. The first thing to notice is that CP/M based systems like SuperCalc and CalcStar will not be able to switch in that extra RAM, so they are limited to on-board RAM (approximately 60K program and data space maximum). Most other spreadsheet programs either make no provision for expanding their usable memory, or need a pre-boot disk of some sort.

Again, all the data I have on the various spreadsheet programs is empirically derived, so it is bound to be open to questions — especially since all of them use different memory management algorithms and are more efficient at handling one sort of model configuration than another.

48K or 64K Apple][(Standard Configurations)

1) VisiCalc
2) THE Spreadsheet (Ver. 1.0)
3) THE Spreadsheet (Ver. 2.0)
4) SuperCalc
5) Multiplan
6) CalcStar

The first three all display the remaining memory in terms of "K-bytes" left. While VisiCalc shows less memory with an empty worksheet, in reality it is able to store more information in that space than THE Spreadsheet (Ver. 1.0). THE Spreadsheet (Ver. 2.0) gives away a few K-bytes of data space in return for ease of use, and expandability.

Multiplan has a totally different concept of large modeling applications. Most large models can be broken into a series of smaller ones. Multiplan enables the user to link these smaller "detail" worksheets together automatically into a summary worksheet. Granted, you cannot have all of the data in memory at once, but you can call in a great deal of summarized data.

Expanded RAM Card Support

THE Spreadsheet (Ver. 1.0):	None.
THE Spreadsheet (Ver. 2.0):	Up to 512K extra memory.
VisiCalc:	Up to 128K extra memory with pre-boot disk[3].
Multiplan:	None.
SuperCalc:	None.
CalcStar:	None.

The only two programs that allow extra RAM are THE Spreadsheet (Ver. 2.0), and VisiCalc. VisiCalc was never designed to access those extra banks of memory, consequently it suffers a considerable degradation in speed when modified to do so. THE Spreadsheet (Ver. 2.0) will recognize most RAM cards in any combination up to one half megabyte. It was specifically designed to take advantage of the big RAM cards, so there is no accompanying memory management problem. Before you go out and create the model to end all models, bear in mind that the bigger the model is, the longer it takes to recalculate. Often the Multiplan approach makes more sense, even with VisiCalc and THE Spreadsheet.

Fortunately, both VisiCalc and THE Spreadsheet (Ver. 2.0) have capabilities that allow linking of different worksheets. The linking mechanism is far less automated than that of Multiplan, but the capability is there in the form of DIF™ files. That brings us to the topic of data interchangeability both between different worksheets, and between the spreadsheet program and other, different programs (like graphics programs).

Interchangeability of Data

It is often extremely important to be able to take the data developed in a spreadsheet model and, for example, make a bar chart of the data. In the micro-computer world, there is no "standard" file format, so very often these different programs are written with absolutely no regard to external data sources. Fortunately, there are some de-facto standards that have evolved, at least in spreadsheet modeling. The most popular, and widely used format is DIF™ (Data Interchange Format), which was developed as a standard definition of data. The other option available is the standard text file, suitable for word processor input.

1) VisiCalc	DIF, Text Files
2) THE Spreadsheet (Ver. 2.0)	DIF, Text Files
3) Multiplan	Linked worksheets, Text Files
4) SuperCalc	Text Files
5) THE Spreadsheet (Ver. 1.0)	Text Files
6) CalcStar	Text Files (WordStar)

The above table is somewhat of an over-simplification because THE Spreadsheet (Ver. 1.0) also writes files that were originally intended for inter-program communication. The problem is that virtually no programs on the commercial market read those files.

As far as communication with graphics, time-series analysis, and other business packages VisiCalc and THE Spreadsheet (Ver. 2.0) come out clear winners. Apparently Multiplan has no such facilities, however it does have the automatic linking feature, which offsets some of the problems solved by DIF files.

All the packages have the facility to write text files to the disk, but some do it more elegantly than others. THE Spreadsheet (Ver. 2.0) provides pagination, even in the disk files. This is particularly handy because the file appears in a (user definable) format acceptable to your word processor. Some of the other packages simply write rows that are as long as it takes to display all the data. This can cause a great deal of pain when editing the model into a written report.

Advanced Features

In the years since the first VisiCalc implementation appeared on the market, many additional features have been added both to VisiCalc and to its competitors. VisiCalc, in its current implementation, is considered to have the "base" set of features. Other features (as implemented in other packages) are commonly referred to as "advanced" features.

The advanced modeling features that have appeared have been driven, to a great extent, by user demand. These features include such things as:

- Independent *column* width
- Protected cells
- Hidden cells
- Formatting features:
  - Centered in column
  - Leading dollar sign
  - Comma edited numeric display
  - User definable decimal display
- Tabbing to entry fields
- Sorting on a given column
- Naming rows or columns
  and many more.

The key point is that software developers have listened to the voice of the market and tried to make their product better than the last "most advanced" spreadsheet calculator.

For every new command or feature included in a program, a certain amount of data space is sacrificed to the program. At a certain point, some of the lesser used features must be kept on disk, and read in only when required. There is a great element of personal preference involved in selecting just how advanced a spreadsheet program you need. As a general rule, the more advanced the program, the bulkier it becomes. Somewhere in this process, what began as a concept elegant in its simplicity becomes a tangled mess of complicated commands that must be either memorized or looked up each time.

The optimal spreadsheet program is one that balances advanced features against speed and usable matrix size. To comment on how well each product has done in its effort to achieve this balance is to presume knowledge of the tastes of the individual users. I personally favor the blend found in THE Spreadsheet (Ver. 2.0), and find it the most usable of the group.

On the other hand, Multiplan has more advanced features than any of the other programs. To accomplish this feat, several compromises are made: Multiplan is generally slower than average, and the usable matrix size is somewhat smaller than average. In addition, some of the commands that are kept on disk take up to 20 or 30 seconds to execute. This is particularly disturbing when you are just trying to insert a new blank row.

The other programs vary in degree between VisiCalc (no "advanced" features) to Multiplan (most "advanced" features). They also vary in success of implementation.

Compatibility with Apple][Peripherals

The one complaint I have heard most often from heavy users of spreadsheet modeling tools is that they cannot find a package that will support their particular hardware configuration. The Apple][can be configured with so many peripheral devices that support seems almost impossible. Let's examine how this has been approached by the various manufacturers:

THE Spreadsheet (Ver. 2.0)

> 80 column boards are supported quite nicely by THE Spreadsheet (Ver. 2.0). Essentially, the board is driven through the disk operating system "hooks." If necessary, a custom driver can be written to support an 80 column board that cannot be driven this way. Three drivers are supplied on disk.
>
> There is a special set of video drivers that generates a "soft" seventy column display on the screen with no hardware modification.
>
> Upper and lower case are fully supported.
>
> Hard disks, and high density floppy disks are supported by THE Spreadsheet (Ver. 2.0). The user is allowed to specify slot, drive, and volume of the particular model desired. Model load time is drastically decreased on hard disk.
>
> Expanded RAM cards (16K up to 128K) are supported in virtually any combination up to 512K extra RAM. This is done automatically by the program.

THE Spreadsheet (Ver. 1.0)

> No support for 80 column boards.
>
> No support for lower case.
>
> No support for hard disk.
>
> No support for extra RAM.

Multiplan

> Most popular 80 column cards are supported through a "setup" program. The Videx support, in particular, is impressive. There is no provision for supporting non-standard 80 column cards.
>
> Upper and lower case are fully supported in 80 column mode.
>
> No support for hard disk.
>
> No support for extra RAM.

VisiCalc

> Several 80 column cards are supported by means of a pre-boot disk, a requirement of many protected programs. Since VisiCalc was never intended to run in 80 columns, the display management is less than optimal.
>
> Upper and lower case supported only in 80 column mode.
>
> No support for hard disk.
>
> Several expanded RAM boards are supported by means of a pre-boot disk. Again, since VisiCalc was never intended to run in an expanded configuration, memory management is compromised.

SuperCalc/CalcStar

> Both of these programs run in CP/M, and use the BIOS to handle the simple definitions for device handling. They also have installation programs to allow more sophisticated definition of console devices.
>
> 80 column boards are supported.
>
> Upper and lower case are supported, if available.
>
> All programs may be run from hard disk.
>
> No support for expanded RAM cards.

User Interface

Most spreadsheet programs make little, if any attempt at a "friendly" user interface. The problem this poses is that commands must either be memorized or looked up. The two exceptions to this are Multiplan and THE Spreadsheet (Ver. 2.0). For practical reasons, there is virtually no user interface in any spreadsheet program when entering data, but when performing certain functions, menu selections are often a nice addition.

THE Spreadsheet (Ver. 2.0) has a "system" menu and sub-menus that: govern all file handling operations (load worksheet, save worksheet, etc.), govern all print operations (including DIF files, and printing to disk), allow you to define your own page format, and one to allow you to configure the program to your hardware.

Multiplan has a menu at the bottom of the screen at all times. Items are selectable from the menu either by moving the cursor, or by typing a command character.

The advantages of a little friendliness are obvious to most users, but the disadvantages are not. The friendlier a program gets, the more questions it tends to ask, and the more keystrokes the user must enter. A computer-oriented user might be inclined to enter the gibberish command strings, rather than selecting menu options. Both THE Spreadsheet (Ver. 2.0) and Multiplan allow you to circumvent the friendly features if you want to, by simply typing the proper numbers and/or letters.

Documentation

One of the most important parts of a piece of software is the documentation. If the document is good, you will be able to learn the program quickly and be able to find reference material easily.

Some of the documents are extraordinarily good, while others are marginal, or poorly organized.

Since I either wrote or edited the documents for two of the packages under discussion here, it is somewhat inappropriate for me to review them, but I will offer a few comments.

1) Multiplan

The Multiplan document is a typical Microsoft document: it is well organized (in general), attractive in appearance, easy to read, and an all around professional job.

2) THE Spreadsheet (Ver. 1.0)

This is one of my documents (with respect to editing), and is, at best, marginal in content. It is poorly organized, with an insufficient tutorial, and simply does not look professional.

3) THE Spreadsheet (Ver. 2.0)

This is another one of my documents, and I believe it compares favorably to any document of its type, but then I am biased.

4) VisiCalc

The VisiCalc document is attractive, well laid-out, and generally professional looking. The tutorial section is good, with plenty of screen photos. The reference guide is easy to use, and the quick reference card is especially good. There were a few places where this manual might have been improved, but all the information is there.

5) SuperCalc

This manual has a very brief tutorial section which is very difficult to separate from the reference section. Often, I felt that some of the information I needed was either not in the manual, or so hard to find that I would rather work around whatever problem I was facing.

6) CalcStar

The CalcStar manual is the least professional of the group. It is extremely brief, and the copy I got was not even printed well. The content is sparse, and the reading dense. This manual does not encourage the user at all.

Price

Unfortunately, we still find that no matter what the relative merits of a program, they will be weighed heavily by a potential user against the price. Often, budgets of people who use personal computers are low.

For this reason, it is important to examine how much you really buy for that hard-earned dollar, and how much it really enhances your productivity.

1) THE Spreadsheet (Ver. 1.0)	Not on the market
2) THE Spreadsheet (Ver. 2.0)	$60.00 sold to A.P.P.L.E. members only
3) CalcStar	$145.00
4) VisiCalc	$250.00
5) Multiplan (DOS 3.3 version)	$275.00
6) SuperCalc	$295.00

In Conclusion

From the observations I have presented, some spreadsheet calculators display consistently lower capabilities than the others against which they are being compared. There is a temptation to eliminate them on this basis, but one must exercise caution in so doing. First, it is important to define the computing environment in which the program is to be run.

If you use CP/M for word processing and database management, the chances are that a CP/M based spreadsheet calculator will be of greater use to you than one that runs in the DOS environment. If you do not feel that there are likely to be any links between your spreadsheet planning and any other computing activities, then the decision must be made independently of computing environment.

In the CP/M environment, CalcStar is clearly less powerful than any of the other spreadsheet calculators. In the DOS environment, however, the speed and power of the programs is far closer[1]. It is extremely important to examine the balance found in the various programs between speed, usable matrix size, and number of advanced features.

For most spreadsheet modeling applications, THE Spreadsheet (Ver. 2.0) has the best balance of features; coming in first, second, or third in every category (and only marginally behind the leader in each case).

If your spreadsheet application requires everything, perhaps it is time to check and see whether a spreadsheet program really solves your problem.

---

1. THE Spreadsheet (Ver. 1.0) is no longer available commercially, but it serves as a useful comparison.
2. Multiplan is available for CP/M, but I have not had the opportunity to try it.
3. The pre-boot disk I used to obtain 80 column display and expanded RAM capabilities with VisiCalc was the one sold by Prometheus Products, Inc.

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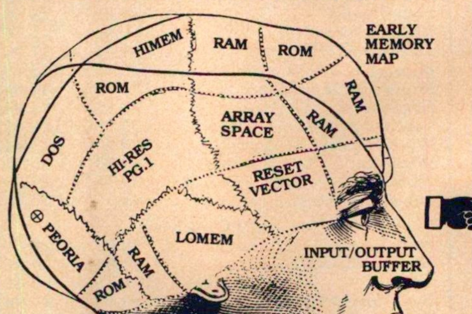

```
10  A$="RUQWLU RBOC YNTOOB C@OBDC":
    SPEED=180: VTAB 10: PRINT A$
20  FOR X=0 TO LEN(A$)-1: S=SCRN(X,19):
    COLOR=S+(S=12)-(S=13)-(SCRN(X,18)>10):
    PLOT X,19: NEXT X: GOTO 10
```

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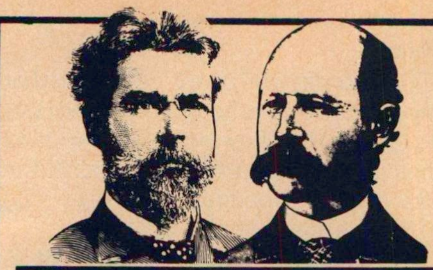

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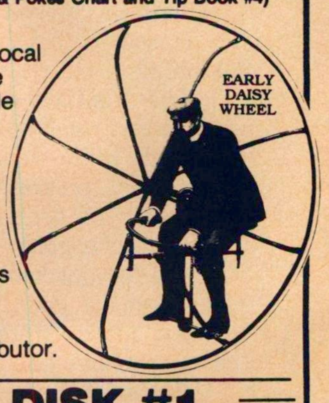

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One of the most popular methods of using machine code to squeeze more out of Applesoft involves using the ampersand technique.

As most of you know by now, the lowly "&" symbol allows you to create an incredible variety of new commands and add power, speed and flexibility to Applesoft. Better yet, every month you can almost be assured that some Apple-related publication will offer a new "amper-utility" for you to drool over. The problem lies in trying to figure out what to do with them all! (Note: good articles on the ampersand technique itself can be found in the May 1980 (p. 26) and Jan. 1981 (p. 27) issues of *Call -A.P.P.L.E.* as well as on pg. 123 of *Call A.P.P.L.E. In Depth — No. 1).*

To begin with, I suggest that you take the logical step of setting aside a disk or two just for amper-utilities. You can then pick and choose from among them and put together a nice little package suitable for the Applesoft program you are developing. You will need to choose from among them simply because there are far more amper-utilities out there than you have room for in memory.

Now, to be able to use amper-utilities you cannot just load a bunch of them into memory and hope that the ampersand will find the right one. Rather, there are two issues that you must deal with first: *command parsing* and *relocatability.*

Command parsing refers to analyzing the command following the "&" character in the program and finding the utility program in memory that corresponds to it. If the Applesoft interpreter, as it scans and executes your program, finds an "&" character, it turns control over to the instruction at location $3F5 (1013). This is where you put a machine code instruction to transfer control to an amper-utility in memory. The problem is: which one?

One method of handling this problem is to have the beginning of each utility check each letter of the & command and if there is a mismatch, control is passed to the next utility down the line for checking. The problem with this method is the complexity reached when several utilities are being used; when files become large or when utilities are removed or added. Clearly, a better method is needed.

A better solution is to create *one* parsing routine, separate from the utilities, that receives control from the amper-vector at $3F5 and then transfers control to the proper amper-utility. Such a scheme involves using a command table of valid amper-command names to check the & name in the program against an address table to find the address of the appropriate amper-utility when the correct name is located.

```
:ASM

                  **********************************
                  *                                *
                  *    AMPER-LIBRARY FRONT END     *
                  *                                *
                  *         by Bill Parker         *
                  *                                *
                  * Call -A.P.P.L.E. : June 1983   *
                  *                                *
                  **********************************

                  *  Note: Step 1 begins at the
                  * end of this front end.
                  * Work your way back up.

                  *==============================*
                  *       FRONT END -- Step 5    *
                  * Decide program's beginning   *
                  *------------------------------*

                  *  The following information is for using the insert-the-
                  * machine-code-program-between-DOS-and-its-buffers method:

                  *  A. ASM)ble this program to determine its length.
                  * The PAUSE statement at the end of this program
                  * will allow you to hit the space bar and see the length. Write
                  * this number down and hit [RETURN] to continue the assembly.
                  *  B. Q)uit, C)atalog, BRUN EXAM/MOVE
                  * DOS BUFFERS, enter [CR], and reenter the E)ditor.
```

Just such a technique is used in the excellent article, "Print Using and Friends" (PUF), on p. 85 of the *Call -A.P.P.L.E. In Depth — No. 1* issue. Despite its cryptic name, it really is something that can help you in a variety of Applesoft programming situations. What is presented here is an expanded version of it.

With such a routine, you can combine any combination of amper-utilities and use them in any order from within a program. This is done by first loading the routine into memory, appending all the amper-utilities you want beneath it, storing the names and starting addresses of each utility in command and address tables, and setting the ampersand vector to point toward the routine. Because the routine is in front of all of the amper-utilities, it is also known as a "front end processor" and is referred to by that name in this article.

The solution to the first problem of command parsing, unfortunately, brings us to the second problem of relocatability.

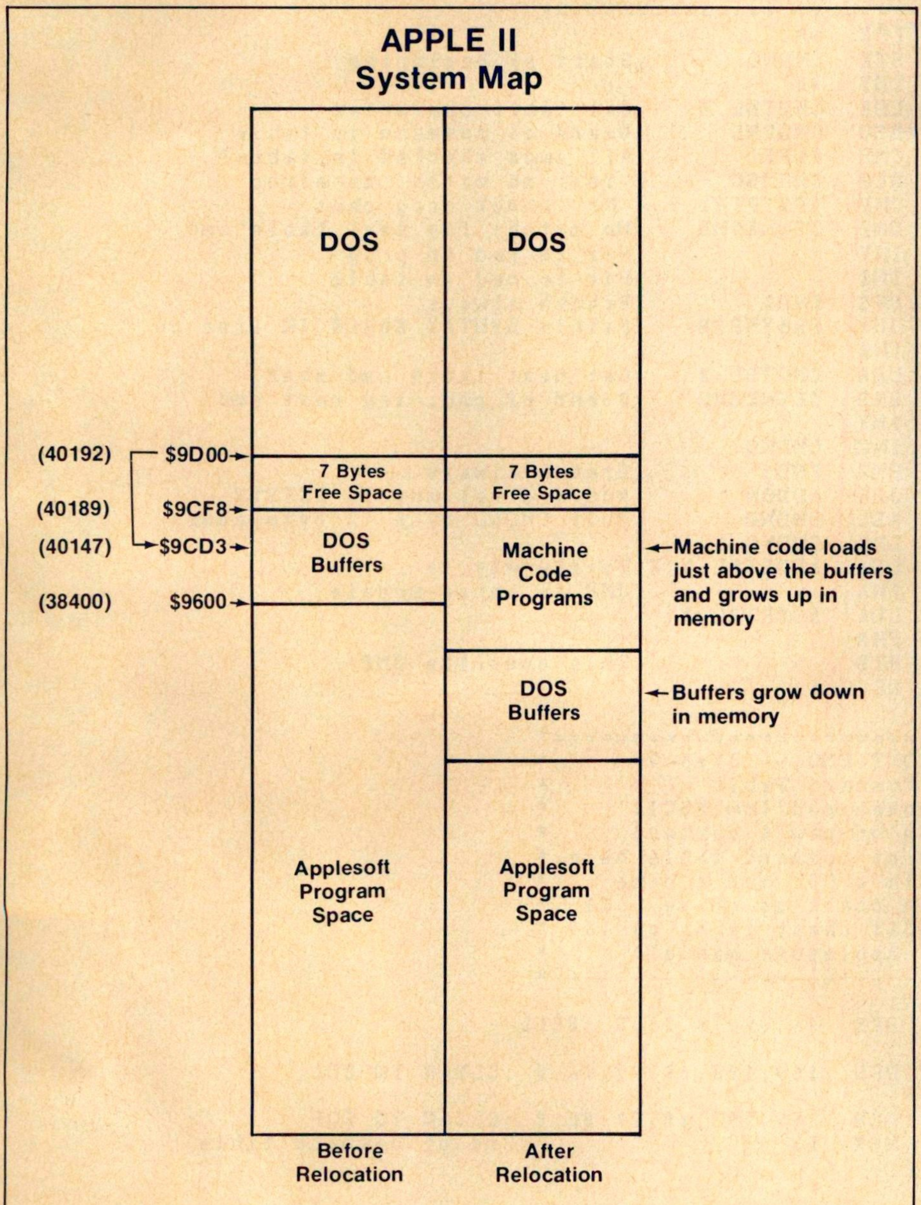
```
                 *   C. Use the USER command to find the beginning
                 * of the DOS buffers.  Put them where you want them.
                 *   D. Move the buffers down the length of this
                 * program, e.g., $9CF8-156 (where len=156)
                 *                        $9C5C [CR]
                 * Your program will assemble and load just above this.
                 *   E. Update the two statements below with the
                 * buffer address + 1:
                           ORG  $8000        ;e.g., $9C5D would go here
                           OBJ  $8000        ; "        "     "    "    "

                 *   F. ASM)ble again, Q)uit and S)ave both the source
                 * and the O)bject file under a new, convenient name.
                 *   G. Q)uit to BASIC and POKE 72,0 to clear an error caused by
                 * Big Mac's O)bject save command. This program can then be BRUN
                 * and will automatically set the DOS buffers and the
                 * ampersand vector to the proper locations.

                 FRONTBEG EQU  *

8000: 38         PUSHBUFS SEC
8001: A9 00               LDA  #<FRONTBEG
8003: E9 26               SBC  #38
8005: 8D 00 9D            STA  BUFPTR
8008: A9 80               LDA  #>FRONTBEG
800A: E9 00               SBC  #0
800C: 8D 01 9D            STA  BUFPTR+1
800F: 20 D4 A7            JSR  MOVEBUFS
8012: A9 1D      SETAMPHK LDA  #<PROGBEG
8014: 8D F6 03            STA  AMPERHK+1
8017: A9 80               LDA  #>PROGBEG
8019: 8D F7 03            STA  AMPERHK+2
801C: 60                  RTS

                 PROGBEG  EQU  *

                 *==============================*
                 *      FRONT END -- Step 4     *
                 *       Table of Equates       *
                 *  Move EQUates from amper-    *
                 * module to this centralized   *
                 * area.                        *
                 *------------------------------*
                 *       Page 0 Locations       *
                 *------------------------------*
                 TXTPTR   EQU  $B8

                 *------------------------------*
                 *        Keyboard Buffer       *
                 *------------------------------*
                 KEYBDBUF EQU  $200

                 *------------------------------*
                 *       Page 3 Locations       *
                 *------------------------------*
                 AMPERHK  EQU  $3F5

                 *------------------------------*
                 *        DOS Locations         *
                 *------------------------------*
                 BUFPTR   EQU  $9D00
                 MOVEBUFS EQU  $A7D4
```

Relocatability refers to the capability of a machine language program to run anywhere in memory. This is an important feature if you must move a program around in memory or cannot guarantee that a program will have the same starting address. The problem with writing code so that it is relocatable is that it is difficult, unwieldy, and uses excessive memory. It is also impossible if you need storage for tables, ASCII characters, etc. Once you have set up a storage area that is attached to the program, *the program instantly becomes non–relocatable.* Since once you specify in the program where the table begins, when the program is moved, the table is moved. The program can only look at the old address of the table, which just isn't there anymore.

The problem becomes more serious when you realize that most amper–utilities, as presented in magazines, are non–relocatable! While it is possible to translate a non–relocatable program into a relocatable one, the method is complicated, has restrictions, and is beyond the scope of this article.

The solution to this is to use an *assembler* as something called a "relocating linking loader," which can relocate any number of machine code programs anywhere in memory. We will also need a good place in memory to deposit the program.

The remainder of this article shows you how to use the Big Mac assembler to load a front end amper–command processor and all the amper–utilities you want into an area of memory protected by DOS and its buffers. As discussed in the January issue, this area provides protection against everything except being overwritten by other programs that blindly load into the area beneath DOS without regard to where the buffers begin. (Sadly, such an example is GPLE).



— figure 1 —

Here's what the area looks like (see Figure 1). Note that the bottom of DOS proper is not where you might think it is and that the pointer to the "beginning" of the DOS buffers is actually 37 bytes below the actual beginning!

A snappy little utility is enclosed here called, "EXAM/MOVE DOS BUFFERS." It takes all the bother out of trying to find out where your buffers actually begin and can also move the buffers up or down any distance you like. While intended for use within Big Mac's "USER" command to aid in the construction of your Amper–Library, it can also function by itself through the "&" symbol just as well.

The major thrust of this article, however, is dedicated to the following listing of a front end processor that is loaded with remarks to hold your hand and walk you through the steps necessary to create your own amper–library. Once you get the hang of it, you can easily add or remove amper–utilities from the library and save the library under a different name that is ready to be BLOADed and used from a running Applesoft program.

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```

                 *------------------------------*
                 *     System I/O Locations     *
                 *------------------------------*
                 STROBE   EQU  $C000
                 STRBCLR  EQU  $C010

                 *------------------------------*
                 *      Applesoft Locations     *
                 *------------------------------*
                 ADDON    EQU  $D998
                 PRSYNERR EQU  $DEC9

                 *------------------------------*
                 *       Monitor Locations      *
                 *------------------------------*
                 BELL     EQU  $FBDD
                 CLREOL   EQU  $FC9C
                 CLREOP   EQU  $FC42
                 *==============================*
                 * FRONT END - & Command Parser *
                 *  Compare &command with table *
                 * and find its number.         *
                 *------------------------------*
801D: A2 00      CMDPARSR LDX  #0
801F: 8E 56 80            STX  CMDNO        ;Start at beginning
8022: A0 00      FND1     LDY  #0
8024: BD 57 80   FND2     LDA  CMDTBL,X     ;Get table character
8027: F0 1B               BEQ  CMDFND       ;0=end of command in table
8029: C9 FF               CMP  #$FF         ;All cmds checked in table?
802B: F0 08               BEQ  ERRMSG       ;-Yes; no match, so error
802D: D1 B8               CMP  (TXTPTR),Y   ;-No; check prog char
802F: D0 07               BNE  GETNXCMD     ;No match; try next table cmd
8031: C8                  INY               ;Ptr to cmd in prog
8032: E8                  INX               ;Ptr to cmd in table
8033: D0 EF               BNE  FND2         ;Branch always
8035: 4C C9 DE   ERRMSG   JMP  PRSYNERR     ;Prints SYNTAX ERROR IN line no.
8038: E8         GETNXCMD INX
8039: BD 57 80            LDA  CMDTBL,X     ;Get next table cmd char
803C: D0 FA               BNE  GETNXCMD     ;0=end of cmd; try next cmd
803E: E8                  INX
803F: EE 56 80            INC  CMDNO
8042: D0 DE               BNE  FND1         ;Branch always
8044: 20 98 D9   CMDFND   JSR  ADDON        ;Add Y displcmnt to TXTPTR
8047: 0E 56 80            ASL  CMDNO        ;Mult CMDNO by 2 (2 byte addr)
804A: AE 56 80            LDX  CMDNO
804D: BD 6A 80            LDA  ADDRTBL+1,X Tricky way to
8050: 48                  PHA               ;JMP to amper-module
8051: BD 69 80            LDA  ADDRTBL,X
8054: 48                  PHA
8055: 60                  RTS               ;This does the JMP!
                 CMDNO    DS   1

                 *==============================*
                 *       FRONT END -- Step 3    *
                 *          Command Table       *
                 *  Add tokenized/low ASCII     *
                 * version of new & command     *
                 * at end of command table here *
                 * End with a "0" and a name.   *
                 *  (Token chart is on pg. 121  *
                 * and ASCII chart is on pg 139 *
                 * of the Applesoft manual).    *
                 *------------------------------*
8057: 42 45 4C
805A: 4C 00      CMDTBL   DFB  66,69,76,76,0 ;BELL
805C: BD C1 45
805F: 4F 4C 00            DFB  189,193,69,79,76,0 ;CLEAR TO EOL
8062: BD C1 45
8065: 4F 50 00            DFB  189,193,69,79,80,0 ;CLEAR TO EOP
8068: FF                  HEX  FF                ;End of command table
```

```
                    *=================================*
                    *      FRONT END -- Step 2        *
                    *         Address Table           *
                    *  Add name of new & command      *
                    * at end of address table here    *
                    * (must be same as label at       *
                    * beginning of new & module).     *
                    *---------------------------------*
8069:  DC FB        ADDRTBL   DA    BELL-1
806B:  9B FC                  DA    CLREOL-1
806D:  41 FC                  DA    CLREOP-1

                    *=================================*
                    *      FRONT END -- Step 1        *
                    *         Amper-Modules           *
                    *  Append ampersand utilities     *
                    * here.                           *
                    *  New utilities must have any    *
                    * ORGs/OBJs stripped off and      *
                    * they must begin with a label    *
                    * (used in the Command and        *
                    * Address Tables above).          *
                    *  Be sure to keep the PAUSE      *
                    * statement at the end of the     *
                    * utilities.                      *
                    *---------------------------------*


--End assembly--

111 bytes

Errors: 0
```

```
:ASM

                    **********************************
                    *                                *
                    *     EXAM/MOVE DOS BUFFERS      *
                    *                                *
                    *         by Bill Parker         *
                    *                                *
                    * Call -A.P.P.L.E. : June 1983   *
                    *                                *
                    **********************************
                    *                                *
                    *   This program tell you the    *
                    * actual beginning address of    *
                    * your DOS buffers.              *
                    *   It then waits for you to     *
                    * type in either how many        *
                    * bytes (in decimal) you want    *
                    * to move the buffers down (-)   *
                    * or up (+), or if you want to   *
                    * R)estore the buffers to        *
                    * their normal location at       *
                    * $9CF8. A [C/R] then rebuilds   *
                    * the buffers at that location   *
                    *   This program can be used     *
                    * to move the DOS buffers        *
                    * below a machine code program   *
                    *   To use as is, BRUN it and    *
                    * use the & command to           *
                    * initialize it.                 *
                    *   To use from Big Mac, do      *
                    * the following: BRUN BIG MAC,   *
                    * enter E)dit, enter MON)itor,   *
                    * BRUN EXAM/MOVE DOS BUFFERS,    *
                    * enter [Ctrl-Y] [C/R], enter    *
                    * E)dit mode, then enter USER    *
                    *                                *
                    **********************************


                             ORG   $300
                             OBJ   $300

                    *================================*
                    *       Table of Equates         *
                    *     (Alphabetical Order)       *
                    *================================*
```

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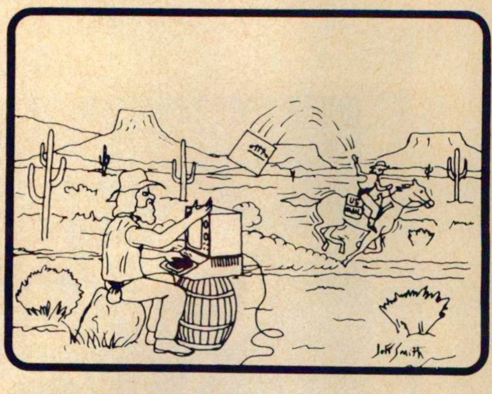
```
                 AMPERHK  EQU  $3F5
                 BUFPTR   EQU  $9D00
                 COUT     EQU  $FDED
                 CR       EQU  $8D
                 CROUT    EQU  $FD8E
                 FRMEVL   EQU  $DD7B
                 GETADR   EQU  $E752
                 INLIN    EQU  $D52C
                 KEYBDBUF EQU  $200
                 LINNUM   EQU  $50
                 MOVEBUFS EQU  $A7D4
                 PRNTAX   EQU  $F941
                 RDKEY    EQU  $FD0C
                 TXTPTR   EQU  $B8

                 *==============================*
                 *   Reset Ampersand Vector     *
                 *==============================*
0300:  A2 0B     RESETHKS LDX  #<EXAMBUFS ;Enable Big Mac's
0302:  A0 03              LDY  #>EXAMBUFS ;"USER" command to
0304:  8E F6 03           STX  AMPERHK+1  ;point toward this routine
0307:  8C F7 03           STY  AMPERHK+2
030A:  60                 RTS
                 *==============================*
                 *        Main Program          *
                 *==============================*
030B:  A9 A4     EXAMBUFS LDA  #"$"       ;Show hex notation
030D:  20 ED FD           JSR  COUT
0310:  AD 00 9D           LDA  BUFPTR
0313:  18                 CLC
0314:  69 25              ADC  #37        ;Add displacement to
0316:  AA                 TAX
0317:  AD 01 9D           LDA  BUFPTR+1   ;actual top of buffers
031A:  69 00              ADC  #0
031C:  20 41 F9           JSR  PRNTAX     ;and print actual address
031F:  20 0C FD  GETANS   JSR  RDKEY
0322:  20 ED FD           JSR  COUT
0325:  C9 8D     EVALRESP CMP  #CR
0327:  F0 4C              BEQ  END
0329:  C9 AD              CMP  #"-"
032B:  F0 0A              BEQ  MOVEDOWN
032D:  C9 AB              CMP  #"+"
032F:  F0 1D              BEQ  MOVEUP
0331:  C9 D2              CMP  #"R"
0333:  F0 30              BEQ  RESTORE
0335:  D0 D4              BNE  EXAMBUFS
0337:  20 78 03  MOVEDOWN JSR  SETUPMOV   ;Convert dec displ. to hex
033A:  38                 SEC             ;Makes SBC work properly
033B:  AD 00 9D           LDA  BUFPTR     ;Subtract displacement
033E:  E5 50              SBC  LINNUM     ;from where DOS buffer
0340:  8D 00 9D           STA  BUFPTR     ;pointer is pointing
0343:  AD 01 9D           LDA  BUFPTR+1
0346:  E5 51              SBC  LINNUM+1
0348:  8D 01 9D           STA  BUFPTR+1
034B:  B8                 CLV
034C:  50 BD              BVC  EXAMBUFS   ;Branch always
034E:  20 78 03  MOVEUP   JSR  SETUPMOV   ;Convert dec displ. to hex
0351:  18                 CLC
0352:  AD 00 9D           LDA  BUFPTR     ;Add displacement
0355:  65 50              ADC  LINNUM     ;to DOS buffer pointer
0357:  8D 00 9D           STA  BUFPTR
035A:  AD 01 9D           LDA  BUFPTR+1
035D:  65 51              ADC  LINNUM+1
035F:  8D 01 9D           STA  BUFPTR+1
0362:  B8                 CLV
0363:  50 A6              BVC  EXAMBUFS   ;Branch always
0365:  A2 D3     RESTORE  LDX  #$D3       ;Normal pointer
0367:  A0 9C              LDY  #$9C       ;settings
0369:  8E 00 9D           STX  BUFPTR
036C:  8C 01 9D           STY  BUFPTR+1
036F:  20 8E FD           JSR  CROUT
0372:  B8                 CLV
0373:  50 96              BVC  EXAMBUFS
0375:  4C D4 A7  END      JMP  MOVEBUFS   ;Rebuild bufs at new setting
```

```
                   120 *====================*
                   121 *  Subroutine Section  *
                   122 *====================*
0378:  A2 00       123 SETUPMOV LDX   #<KEYBDBUF
                              ;Lets FRMEVL work
                               properly
037A:  A0 02       124           LDY   #>KEYBDBUF
037C:  86 B8       125           STX   TXTPTR
037E:  84 B9       126           STY   TXTPTR+1
0380:  20 2C D5    127           JSR   INLIN
                              ;Get dec. displace
                              ment
0383:  20 7B DD    128           JSR   FRMEVL
                              ;Put in FAC
0386:  20 52 E7    129           JSR   GETADR
                              ;FAC to LINNUM
                              (2 byte form)
0389:  60          130           RTS

--End assembly--

138 bytes

Errors: 0
```



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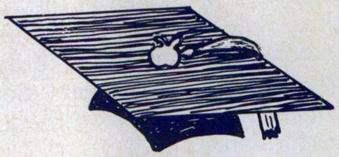


Michael Shadick

YOU know it.

Kids and others who've been exposed (*subjected?*) to it at school, know it.

Know what? That most educational software *stinks.* (There's another "s" word which describes it even better.) Pardon the rough language, but it's the Gospel truth that most of the people who write educational software know lots about programming, but precious little about teaching *or* learning.

And it shows.

Most of the educational software of today (we won't even *mention* yesterday's!) seems to subscribe to the three B's: Boring, Banal, and just plain Bad.

There's a relatively new educational "movement" afoot, however, that shows a great potential for changing all of the above. A movement which portends to radically alter the very *concept* of educational software. (Though it could be argued that there is no such concept to alter!).

Of what, then, will the new software consist? Of a marriage between two hitherto unrelated (and, indeed, allegedly opposed) philosophies: the philosophy of *learning* (and teaching), and the philosophy of the *video arcade game.*

Before any educators or others among you laugh, consider the powerful (and yes, potentially *positive*) influence which video games exert over tens of millions of youthful Americans. Even more significantly, consider *why.* That is: Why have video games so completely captured the hearts (if not the hands) of young America?

There are, of course, many possible answers to that question, depending on which "expert" you talk to, and also on which side of the parental/educator fence they happen to be sitting! Yet all will agree that one of the primary ingredients in the phenomenal success of video gaming, both at the arcades and at home, is: These games offer the element of *endless challenge.* The video game player is constantly challenged *by the game itself* — challenged to ever improve his or her score, i.e., his or her performance at the game, whether the game be PacMan, Space Invaders, or you–name–it.

Indeed, for most of the arcade *and* home games currently in vogue, there is theoretically *no upward limit* to performance whatsoever! In other words, the challenge of the games is *omnipresent,* if you will, whether you're an old pro at the particular game you happen to be playing, or a beginner.

The reader will note that the above characteristic of video games — the *endless challenge* which they present, and *continue* to present, to *every* player — is the very same characteristic that is conspicuous by its utter absence from most educational software. Indeed, most of the software programs in current use in schools today are largely concerned with (shudder!) *eliminating* as much of the challenge that they inherently (if accidentally) possess, as possible! Such, indeed, is their very *object*!

AN APPLE FOR THE TEACHER

Kathryn Hallgrimson Suther

SEVERAL members and readers have communicated a desire for an educational column. As a club, we strive to meet the needs of our members and hope this series will be helpful to educators and parents alike.

We would like to encourage teachers and writers, affiliated with the educational process, to contribute material for possible publication. If you are teaching a computer course, perhaps you have success or "sob" stories to relay. Jotting down your experiences and developing them into an article could very well be of general interest. Don't hesitate to be artistically creative. We'd love photographs and/or art work, which enhance the article and our magazine.

Teachers are also interested in the educational software available on the market. Perhaps you're very pleased with a program used in your classroom. Other educators may like to hear about it. What about those basic skill programs you purchased to help your children at home? How are they working out? What opinions do your children have on these programs?

Remember the world of education stretches into many facets of life. You need not limit yourself to the previous suggestions. Feel free to contact us at the editorial office if you have any questions.

In this issue we inaugurate the column with a general discussion on educational software between Michael Shadick and Mark Cross. We include a book review on KIDS AND THE APPLE along with a software review of Master Type, two fine products which deserve your attention.

Looking ahead, we have scheduled a review on Arcademic Skill Builders by *Developmental Learning Systems.* In the months to come, we shall focus on both reviews and other types of informative features. Keep your eyes on this column, and if you can, give us a helping hand.

THE ARCADIAN APPROACH

Thus, a student who is "learning" via educational software, is able to sooner or later (usually sooner) fully *master* whatever learning activities or tasks are presented in the software, thus rendering said software completely useless in terms of its ability to supply any further motivation whatsoever to improve the learner's performance.

In starkly dramatic contrast, video games never cease to challenge the "learner"! And the player is in fact learning every second. *He or she is learning how to improve his or her performance!* That propensity — or eternal potential, as it were — which every popular video game possesses in such unlimited measure, is the very factor which makes these games enduringly and unendingly popular with so many growing millions of players.

Imagine, if you will, if learning tasks as relatively mundane as spelling and arithmetic were made as challenging as today's video games! Impossible? *Not at all!* Several educational software firms are, even as I write these words and you read them, taking the first small steps (giant steps for humankind?) towards successfully applying the phenomenally high motivational aspects of video games, directly to educational software development. One such firm even has the audacity (though some might term it the farsightedness) to term the resulting software as their "Arc–Ed" curriculum!

To report in–depth, however, on the success of these pioneering projects (though some parents and educators might describe them in less glowing terms!) would be — at this junction — premature, at best. Suffice to say, then, that at this point, Arc–Ed software is receiving mixed reviews, and is being greeted with its share of acceptance, rejection, and notoriety. (Perhaps needless to say, none of the rejection is coming from students!)

Thus, it remains to be seen as to whether the motivational characteristics which have made and are making video gaming such an overwhelmingly popular phenomenon, can be successfully applied to educational software. One thing seems sure, however: "traditional" educational software sorely needs a shot in the arm — nay, massive transfusions! — if it is to ever achieve its touted potential. And the unparalleled challenge, motivational, and performance–improvement characteristics of video gaming, may be just what the doctor — or in this case, the instructor — ordered!

Seemingly for years now, educators have downplayed, pooh–poohed, and even degraded and decried the influence which video games are having on America's youth. Perhaps it is time now for educators to take a second, more constructive look at the games, with an eye out for more closely scrutinizing and analyzing exactly what are the motivational and challenging aspects of the games which work so well in improving the performance of their players!

For what end? For the purpose of applying the unprecedented motivational levels of the games, to the most important "game" of all: namely, *educating today's students for tomorrow.*

THE ARCADE GAME CALLED LEARNING?

Michael Shadick

The comments made by Dr. Cross
Are all too true! And yet,
Were arcade "tricks" injected into
Courseware, one can bet
The programs would get used much more!
Or should we say, get PLAYED?
Let's face it: Kids respond when more
Excitement is displayed!

It's true that zapping aliens
Does not teach much deep thought.
And yet, that arcade FLAVOR is
Why games are selling hot!
So, why not just incorporate
Some "arcademic" action
In programs which are meant to teach.
They'd have much more attraction!

The "smartest" courseware in the world
Is useless, if not USED.
It might teach reams of careful thought.
So what, if it's refused?
Adventure games — today, that's where
The action surely is!
If teachers aren't adventurous,
They're in the wrong, wrong biz!

The students of today embrace
The video game age.
If things were only diff'rent? Well,
They aren't! The courseware sage
Who still persists in programming
For only "careful thought"
Might win much praise. And yet, will
Students USE it? Likely not!

Unlike so many, I believe
The younger generation
Is rapidly acquiring skills
They'll need, to lead our nation!
Technology has far surpassed
The "boob tube" era. Now,
The kids are INTERACTING with
Their micro screens — and HOW!

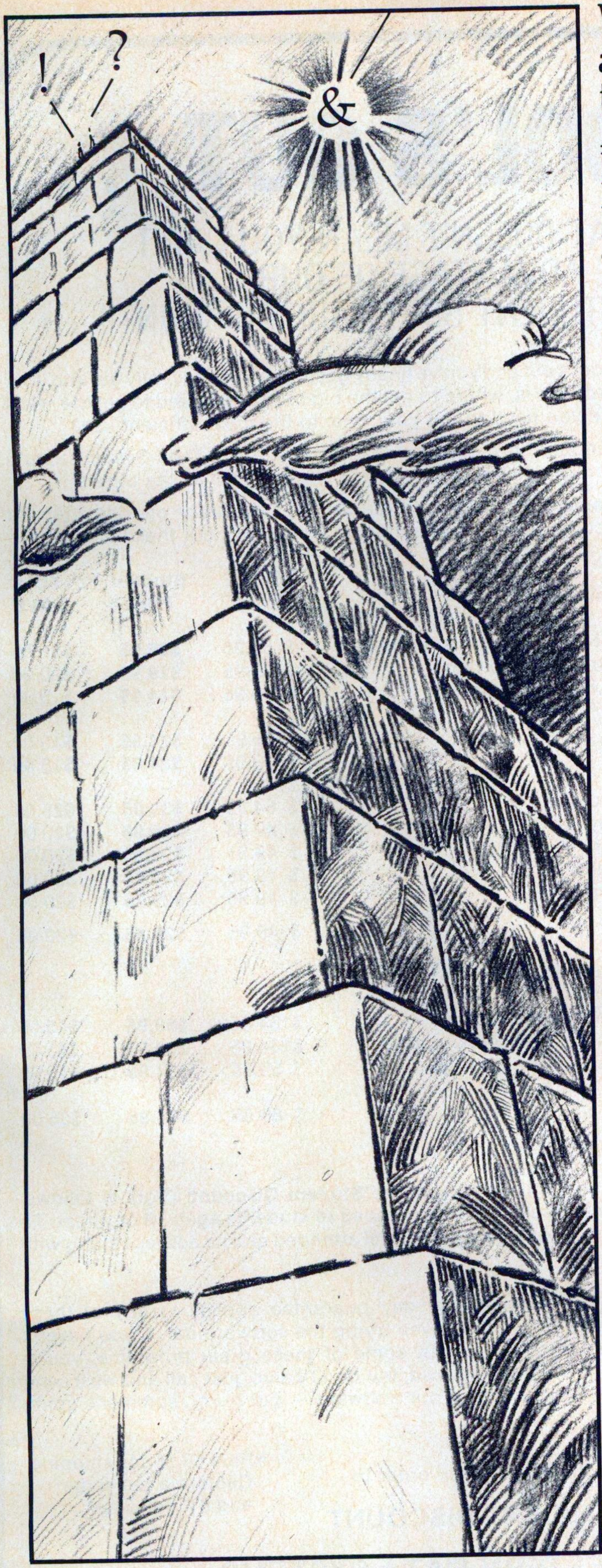
Dare courseware writers "miss the boat"
By programming just knowledge?
Indeed, they well might benefit
By going back to "college"!
I'm speaking of the education
Taking place each day
In student video arcades!
(You know a BETTER way?)

EDITOR BYTES BACK

From Page 5

There's lots more to tell about, but we'd rather take a couple of lines to mention that the **Anaheim Applefest** appeared to have been a roaring success, and judging by attendance, there will be another one next year. The A.P.P.L.E. booth staffed by nine of our best, had people stacked four deep most of the time, and lacked not for popularity.

By now, (May, as we write this) the **Boston Applefest** is history to you, an adventure to us. We hope in July to pass on at least a comment or two on what should be one of the two biggest Apple shows in the country. And with that, we have run ourselves out of space, so our parting comment must be a brief "catchya later"



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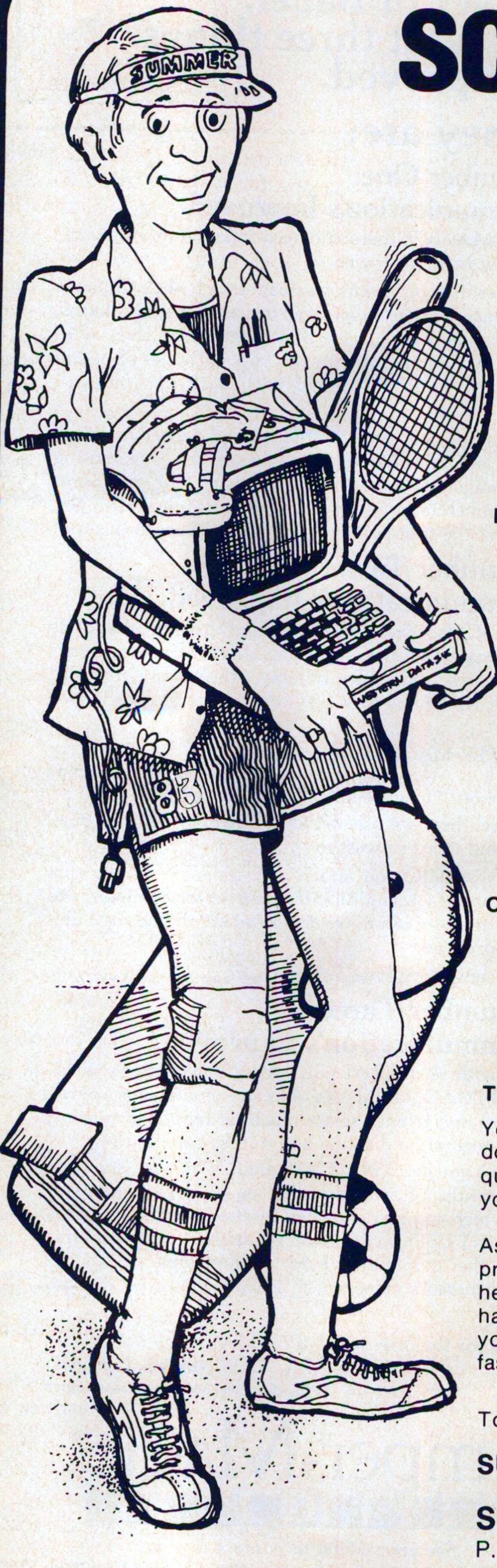

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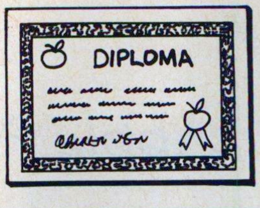
EDUCATION IS AN ADVENTURE GAME



Dr. Mark Cross

WHY do we waste so much energy blasting electronic spacemen? It's not just the fun of meeting a challenge. Look at how chess has died down as computer games grew up. Arcade games offer bushels of small challenges and give frequent bright, loud rewards. Who wouldn't go for the activity that gave the biggest reward for the smallest effort?

It's suggested that arcade game methods could improve educational programs. Maybe. The games teach quick but shallow thinking. All you learn is how to run and shoot, but you learn it so well that it becomes an intuitive response.

When do schools want to teach quick, automatic responses? Some would say "Never. That's training, not education." But, here are some examples of rote learning:

1) ARITHMETIC — Look at the series of games by *Arcademics.* You have to blast math problems disguised as aliens. The purpose is to increase your speed at one-digit arithmetic.
2) TYPING — The *Typing Tutor* and *Master Type* games force you to look at the screen while you type. This is a legitimate area for training automatic responses, not thought processes.
3) SPELLING — An educated person should spell well enough to be nervous when he spots an unusual word. We used to teach this by mountains of reading. After exposure to thousands of correct words, the wrong words look funny. No one has yet done a "shoot the misspelled words" game. It could have the same flow as the game where you shoot the bad tanks and trucks, but don't hit the ambulances.
4) MEMORIZATION — Geographical places, historical dates, chemical symbols, etc. Some facts have to be stored in the mind for instant recall at arcade game speed. Think of the old "College Bowl" television game.

And that's about it. I tried to write a fast action game that taught physics and failed miserably. Science problems can't be solved by shooting from the hip. You have to study them for a few hours.

After the sixth grade you're supposed to know rote learning. *education* trains the mind for careful, critical thinking. And here's where the title comes in. The arcades have to take quarters as fast as they can, but home computers don't mind quiet thinking time. People enjoy these harder challenges too. The adventure games are best sellers. Look at the popular detective stories *Snooper Troops* and *Deadline.* Computers love complex problems with several branches to take after the user's choice.

So why are all the adventure games written about mythical places? Adventure games can teach real–world knowledge. The skill of studying a circuit diagram is similar to studying a dungeon map. A party of explorers discovering America meet some of the same problems as a Wizardry party. An adventure can be solved by finding and combining the right chemicals for reactions that just happen to be used in real labs. How about re-creating DeSoto's adventure? Creative Computing and MECC did a good job with Oregon Trail and Fur Trader.

Programs created by uneducated people can't teach. The average teenage wonder writes "Blast the Baddies" and does a good job, but he drops out of school to do it. Those who stay in school don't get so deep into machine language. They can't write computer games as well.

What we need is a teacher who loves adventure games. He/she could create an educational plot. Then the programmer, a different person, could write the game to order. Finally the program should have good documentation such as in the MECC series. Maybe even a paper and pencil TEST at the end. (I'm a teacher.)

Educators above the sixth grade are crying for ways to teach careful, deep thought. We can't afford the labor cost of teaching everything with a person-to-person Socratic dialog. Adventure games prove that computers can entice people into analytical thought. *Teachers* have to tune in to the games and create new educational scenarios. *Programmers* someday might tire of outer space and talk to the teachers again.

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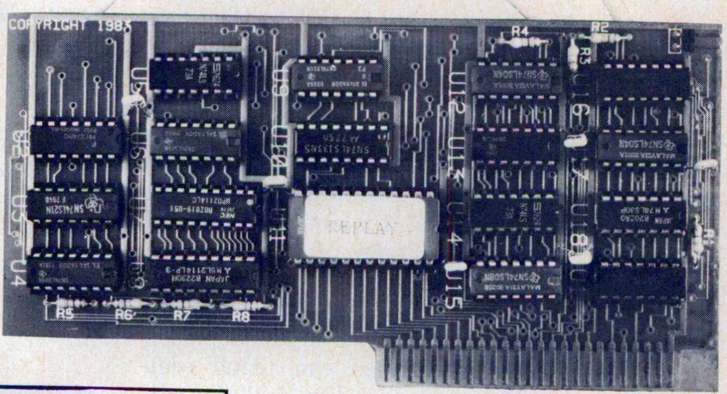

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A **Call -A.P.P.L.E.** BOOK REVIEW:

KIDS AND THE APPLE

Kathryn Hallgrimson Suther/reviewer

Kids And The Apple	*$19.95*
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WITH the advent of the micro computer, the business and educational world is witnessing dramatic changes. As an educator of young children, perhaps you are being pressured to widen your background, become computer literate. After completing necessary courses, you feel ready to bring your newly gained knowledge into the classroom. The question arises "What will we use for a text book?" If you have Apples in your classroom, Kids And The Apple by Edward H. Carlson could very well meet your requirements.

The author wrote this book to teach Applesoft Basic to young people aged 10 to 14, however it can be valuable to "kids" of all ages. It is superbly written and organized into 33 lessons, each containing notes on the topic(s) to be covered. Examples are given to explain concepts; questions and assignments are included with answers supplied at the back of the book. Educators can breathe a sigh of relief with their lesson plan responsibilities, as the author has done a thorough and creative job for you.

The table of contents is divided into three sections: 1) Introduction, 2) Graphics, Games, And All That, and 3) Advanced Programming. This can be useful in your overall course outline. All major BASIC concepts are covered, enabling the student to begin writing simple programs immediately and more complex programs as they progress through the book.

The author has carefully chosen his use of words and examples to explain concepts. His explanations, besides being easy to read, are accompanied by cartoons and often incorporate metaphors, all of which help to relate the topic to everyday experiences. To illustrate a bit of the author's creativity, I have selected a few of my favorite programs from Kids And The Apple. Whether you are an educator, novice programmer, adult or child, I feel you will enjoy them.

The first program is a short guessing game. It utilizes the commands you have learned: INPUT statements, IF. . . THEN statements, and loops using GOTO statements.

```
]LIST

10  REM   --- GUESSING
      GAME ---
15  HOME
20  PRINT "TWO PLAYER
      GAME"
25  PRINT
30  PRINT "FIRST PLAYER
      ENTER A NUMBER
      FROM 1 TO 100"
35  PRINT "WHILE SECOND
      PLAYER ISN'T LOOKING"
37  PRINT
40  INPUT N
45  HOME
50  PRINT  TAB( 12);"MAKE
      A GUESS ";
55  INPUT G
60  IF G < N THEN  PRINT
      "TOO SMALL"
65  IF G > N THEN  PRINT
      "TOO BIG"
70  IF G = N THEN  GOTO
      90
80  GOTO 50
90  REM  THE GAME IS
      OVER
92  PRINT
93  FLASH
95  PRINT "THAT'S IT!"
99  NORMAL
```

The next program illustrates how to move pictures using strings and is a clever example of the concatenation of strings.

```
]LIST

10  REM   >>>---ARROW---->
20  HOME
30 S$ = "  ": REM
         S$ IS A SPACE
40 A$ = ">>>------>"
42  VTAB 10
44  FOR I = 1 TO 29
46  HTAB I
48  PRINT S$ + A$;:
      REM     GLUING
      TWO STRINGS
50  NEXT I
```

Have you ever wondered how alphabetizing programs worked? This last program, along with the author's thorough explanations, teaches you about ASCII numbers and their use in this function.

```
]LIST

10  REM  ALPHABETIZE
20  PRINT
30  INPUT "GIVE ME A
      LETTER: ";A$
35  PRINT
40  INPUT "GIVE ME ANOTHER:
      ";B$
45 A =  ASC (A$):B =
       ASC (B$)
47  REM  PUT IN ALPHABETICAL
       ORDER BY
48  REM  SEEING WHICH
      HAS THE LOWER
      ASCII NUMBER.
50  IF A > B THEN X
      = A:A = B:B =
      X: REM  SWAP THEM
55  PRINT
60  PRINT "HERE THEY
      ARE IN ALPHABETICAL
      ORDER"
65  PRINT : PRINT  CHR$
      (A); TAB( 5);
      CHR$ (B)
```

As I mentioned earlier, the book is full of interesting and functional programs. It's up to you now to see for yourself the real value of this publication.

Permission to publish the programs in this review granted through courtesy of Dave Gordon, president–Datamost.

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THE widespread use of microcomputers has, among other things, encouraged many "hunt and peck" typists to learn proper keyboarding techniques. Lightning Software has produced a computer game, *MasterType,* designed to teach touch typing. The game is of the invaders genre with a central wizard, MasterType, who has the power to destroy enemy words before the words destroy the home base with their missiles.

The program is written in a combination of assembly language and compiled BASIC for maximum speed. The colorful graphics scenario remains in the same format throughout the game. Arcade–like sounds are emitted as the missiles of the enemy words are destroyed in fiery explosions.

The disk is easily booted on any 48K Apple][(or Apple /// in emulation mode), on 13– or 16–sector systems. After booting, the user is given three choices. The first choice is to press the RETURN key which loads the game program. The second choice is to press the L key which takes the player to the portion of the program where their own word list can be created. The third choice will catalog the disk.

To begin to play, after booting and pressing the return key, one needs only to input a lesson number or the name of a word list that you have created on the disk. There are 17 lessons contained on the disk ranging from single letter drills on up to eight and nine letter words, plus number and symbol combinations. Clear directions for each lesson are presented prior to game play. These instructions inform the user of how to position their fingers on the keyboard and also what type of words to expect.

After these instructions, the next screen presents a menu of choices. To play the game with no further changes, the user is instructed to press return and will then be in combat with the enemy words. Four words appear, one in each corner of the screen. The wizard resides in his home base in the center of the screen. If the game is in the cadet mode, the word being typed by the player appears in the center of the screen. Commander mode does not allow the user to see what he/she is typing. The words are continuously firing missiles at home base. If the word is correctly typed, the missile is destroyed by the wizard. After typing a word, the space bar must be pressed to indicate the end of the word. Mistakes may be corrected by either pressing the space bar or by using the left arrow key. Either way, points are lost for making errors.

Any word can be typed at any time, but to achieve the most bonus points and to get a new word, the user must try to destroy the missile when it is still close to the word. The action is fun and exciting as the player types his/her way through four waves of words.

Upon completion, the user is informed as to how many words per minute he/she typed. This is followed by a more complete run down of the point score, the final speed, number of words typed, number of words destroyed, mistakes, and the previous high score. A very pleasant reinforcer is given to the player which states, in a positive nature, whether or not the lesson should be repeated. At this point, it is very easy to begin the same lesson again, move to a new lesson, or quit the game entirely.

After returning to a new lesson number, some changes may need to be made in the format of the game. Instead of pressing the return key to start the game, the C key may be pressed and eight options will be presented. Number one allows the game to be played in the beginner's mode. Numbers two and three allow the speed goal to be increased or decreased. The minimum speed is one word per minute and the maximum is 268–536 words per minute. Number four allows the player to change lessons or end the game. Number five switches from cadet to commander mode or vice versa. Number six enables the game to be played with or without sound. Number seven switches from upper/lowercase display to all uppercase display and vice versa. Number eight permits an unattended demonstration of the game.

Should the user want to create his/her own word list, he/she could select the "Make Your Own Lesson" program from the main menu. He/she will need to have an initialized 16–sector disk for storing the lesson. Lessons may be stored on the original MasterType disk, but Lightning Software strongly recommends that a separate disk be used. Actually, once the lesson is on the disk, it cannot be deleted.

When making a new lesson, the user enters a lesson name (it must begin with a letter) and up to ten lines of description. Next, 40 words with a maximum length of nine characters, may be entered. A chance to edit the list is provided before the words are stored on the disk.

The program is very easy to use because of the menu driven format. The program designer has thoughtfully anticipated the usual run of user errors and guarded against them.

MASTER TYPE

If the disk is found to be defective when it is bought, Lightning Software will replace it free of charge if the original and proof of purchase are returned within thirty days of purchase. If the disk is damaged after that, a replacement will be issued for $5.00 upon receipt of the original disk. Any inquiries are to be addressed to Lightning Software, P.O. Box 11725, Palo Alto, CA 94306.

The documentation is presented in a concise, tidy booklet. It can be read from cover to cover within about 15 minutes and the user will then have a pretty accurate feel for the program. The only discrepancy in the manual is the description of how to get from cadet mode to commander mode. This is done after a lesson has been selected and the second menu is presented. At this point, Change Sound, Lesson, Speed, etc. may be selected.

MasterType is a well-designed and exciting program; one lesson can be played in under five minutes. A word list can be entered in about the same amount of time. It can be used in conjunction with a regular typing course or alone as a means to teach keyboarding techniques. Having the option to turn off the sound greatly enhances classroom use as well. For users who just want to brush up on their typing speed, MasterType is an excellent and fun way to accomplish this goal.

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A DISSENTING OPINION:

WHERE HAVE ALL THE TYPISTS GONE

Gary Breidenstein

I worry a lot. I divide my concern fairly evenly between the large problems, such as nuclear warfare and the state of our public schools, and smaller ones, like next month's rent and the dull ache in my left ear that's getting harder and harder to ignore. One night recently I spent the period between going to bed and falling asleep worrying about typists. Typists as a concept, and in particular.

I've known several. A couple of them stand out in my memory for being notably bright and efficient. They were merely in the typing phase, I think you could say, of their metamorphosis toward being something else. At the other end of the spectrum, one wretch will be vividly remembered by those of us who worked with her for her monumental stupidity. In retrospect it is almost possible to feel sorry for her, but at the time we saved most of our sympathy for ourselves.

Between those two extremes lies the silent, or not so silent, majority. As the years go by their names and faces begin to blur slightly, their distinction from each other becoming less marked, perhaps overwhelmed by the one quality they possess in common which sets them off from the rest of us — their willingness to accept work of that sort. Maybe not even willingness. Maybe the desperation which drove them to accept it.

It is a fact of life that typists are often ill-used. Once or twice it has even occurred to me that I have been guilty of mistreating one myself.

Several years ago — this was well before the age of enlightenment, mind you — I did obscure things for the state government in an obscure corner of the capitol. Each afternoon I put my copy in a box for a pool typist who worked part time in the evenings. The next morning I retrieved it from the box, neatly typed and ready to go. This went on for several months without my ever having seen the typist.

One afternoon somebody came into my office and sat down quietly in the chair behind me. I finished the paragraph I was working on and turned to see what my visitor wanted. It was a demure, round-faced blondish young woman. "Could I help you?" I asked.

"No, I'm all right," she said. Well, if there was nothing she needed from me I might as well go back to what I had been doing. Finally after watching silently for several minutes she got up and left. I couldn't imagine why anyone would want to watch me edit copy, but if the entertainment value was that high, then maybe I should sell tickets. I went out to talk to my friend Kathy, whose desk was just outside my door. Kathy knew everything about everybody in the department.

"What was all that?" I asked her.

"Don't you know who that was?"

"I've never seen her before in my life."

"That was your typist," she said. "Look, you've got to remember this is a small town. I've seen all those sweethearts and liebchens and light-of-my-lifes you put on your notes. Where you come from, nobody pays any attention to that sort of thing. Around here you'd better mean business when you talk that way. She just wanted to get a look at the man who's going to make her the happiest woman in the world. I wonder how you'll like her folks."

The problem with typists is that they fall into a netherworld. Qualities we find attractive in people such as curiosity, initiative and intelligence are often handicaps to being a good typist. A typist with imagination can be a terrible nuisance. Perhaps the ideal one is neither more nor less than an extension of the typewriter, with no human qualities at all.

I work at home these days on an Apple][Plus with a Screen Writer][word processing program and a daisy wheel printer. When I look into my electronic files the information is right there where it ought to be every time. I don't own a bottle of opaquing fluid, and everything I write leaves my desk exactly the way I want it to look. (Okay, I don't use an electronic dictionary so sometimes the spelling is a little creative, but you know what I mean.) Here is a thoroughly efficient typist that is willing to work any hours I care to choose and is extraordinarily inexpensive. This perfect typist is not an extension of a machine — it is a machine. How could any human ever hope to compete? The high-powered executive's high-powered executive secretary will be with us for a long time yet, I think, but isn't the lowly typist about to go the way of the dinosaur and the Edsel and all the other experiments of creation that lost or perhaps never truly found their proper ecological niche? And if so, have we any reason to lament their passing? Of course not. And yet.

Actually there was another time in my life when my copy looked as good as it does today. Once we had a typist — Pam — who was young, attractive, lively and funny, and I was enormously fond of her. And in a way she was probably rather fond of me, too. But we could not get along. Sometimes even just the wrong sort of glance by one of us could send the other into a towering rage.

The nice thing about it for me was that when Pam was angry she was simply not going to allow me to find an error in her work. Her typing and proofreading came very close to computer quality, and she set other people's things aside to do mine first to preclude any complaint from me about deadlines.

There it was, the best of all possible worlds. Quality nearly equal to that of a computer, with something additional thrown in — emotional involvement. Computers are fun, yes, but this was a different sort of fun, and if we're going to lose it forever, I think I'm going to miss it.

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A **Call -A.P.P.L.E.** SOFTWARE REVIEW:

THE GENERAL MANAGER

Doug Pearson/reviewer

The General Manager *$229.95*
Sierra On-Line Inc.
36575 Mudge Ranch Road
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AS a General Manager of a small business, and a heavy user of Apple equipment at work, I was very receptive to the chance of reviewing *The General Manager.* When the request arrived, we were in the process of preparing our company Christmas list with 3500 names to get out of the computer. We were experiencing all the frustrations of our old data base manager, and The General Manager became an interesting comparison.

My goal in reviewing the product (The General Manager, by On-Line Systems, Version 2.0) was to see how it could integrate into our businesses needs. It was easy to compare it to the mailing list application, but how could it save us time in our other duties? The areas which came to mind immediately were those of marketing and inventory. These two areas are the most time consuming in our business (a sound contracting firm), and also have been the topic of much discussion with regard to automation.

Our first consideration involved mailing list applications. We currently use DATASTAR to enter our data in a CP/M environment. The information is then sorted using the companion SUPERSORT and printed to labels with WORDSTAR. This three-program system works well, but involves a lot of disk swapping and processing time. I was particularly interested, therefore, in The General Manager's speed and ease of use.

Each of these two criteria was well addressed by the program's authors. In a database management system, speed is most critical in the sorting and reorganization processes. With sorting, a good program should utilize one of the mathematically rapid sorting processes. The General Manager seemed to be efficient, but without the benefit of a large database to sort, it was difficult to develop an accurate speed estimate.

Ease of use is important, and The General Manager gets an A for user-friendliness. It took about 45 minutes, with the aid of an easy to follow manual, to exercise each of the functions. Within a couple of hours I was designing my own data entry screens and accomplishing some meaningful tests of the program. The program operates on the concept of an outline, much like what we've all done in high school. The user enters data on any level of the outline, after specifying the "path" to follow through the hierarchy of topics. An example could be that of a Christmas card mailing list. The information that you might wish to keep could be outlined like this:

I. Family Name (also address, phone, etc.)
  A. Dates of interest (birthdays, anniversaries, etc.)
  B. Children (how many, birthdays, names)
  C. Holiday correspondence (cards sent/received)
    1. Gifts received (what holiday, gift type)
    2. Gifts sent (what holiday, gift type)

Another example could be an inventory record of an item which your business manufactures, like a bicycle:

I. Model Name (such as model 100, other basic data)
  A. Front wheel
    1. Spokes
    2. Hub
    3. Tire
      a. Valve stem
      b. Innertube
  B. Rear wheel
    1. Spokes
    2. Hub
    3. Tire
      a. Valve stem
      b. Innertube
    4. Gears
  C. Frame
    1. Pedals
      a. Metal pieces
        (A). Shaft
        (B). *Retaining* rings
      b. Rubber pieces
        (A). Left foot piece
        (B). Right foot piece
    2. Handlebars
    3. Seat
    4. Chain

The above outline shows some of the major parts of a bicycle. While it's not complete, you can see the pattern of how a large unit can be broken down into its parts. Once such an outline is done, a screen is designed by the user for entry of the data that are to be stored.

The screen for Handlebars might look something like this:

Part Number: 1256-09
Part Name: Handlebars
Next Higher Assy: **Frame**

Beginning Inv: **300 Units**

Withdrawals from stock
Date: 12/1/76 **Number of Units:** 67
Work Order: 387
Date: 12/2/76 **Number of Units:** 43
Work Order: 396

Additions to Stock
Date: 12/2/76 **Number of Units:** 73
Purchase Order: 8712

Current Inventory: 263 Units

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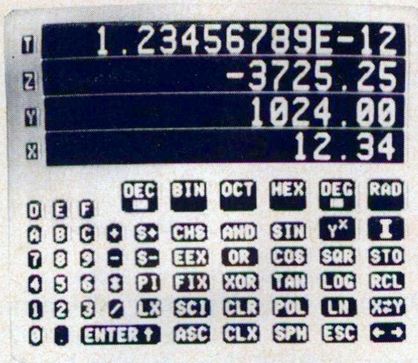
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THE GENERAL MANAGER

Each of the highlighted items is supplied by the database after the user indicates the part number. Once the screen is displayed showing the user the date, quantity, and work order number of any withdrawals, he/she may also add units to stock in a similar fashion. With each entry, the current inventory is updated to show stock on hand.

A similar screen can be used for each of the parts of the bike. Reports can then be generated showing current stock by part number, transaction by date, receipts by Purchase Order, or any method the user might select. Sorting is performed by the program, and report layout is determined in a straightforward manner.

Once the data is stored in the database, updating is performed by browsing through in one of two major ways. The first is to step through record–by–record until you find the one you want.

The second is to type onto the screen any information you know about the entry in question (such as a date, or a work order number). The program will then search for only the entries with those attributes, thus making the browsing process much more efficient. After the desired entry is located, the corrections are entered and the revised entry replaces the old one.

The General Manager was designed to be a complete package for the small business. It offers much to a manager in terms of capability. It does suffer a weakness in terms of immediate application, as very few examples of actual business uses are given in the manual. The reference manual is well thought out and follows the example of the Christmas list consistently for a complete understanding. Our company already had a few other applications which could be adapted to the program, but others (especially new Apple users) might be lost at first while trying to create uses for the program. I would suggest that the authors include another chapter (near the beginning) to plant the seeds of a few more applications in a small business. Something as simple as a list of typical uses would stimulate the new user to thought during the initial learning process.

The strengths of The General Manager are briefly described above. But how about the weaknesses? I was impressed by the function of the program and the fact that I could only find one error in the operation. The manual describes various control functions available during each mode of operation. One of these allows the user to print the contents of the current screen to the printer at any time. Design–wise, the program let me down only this once. As I mentioned earlier, we use a mailing list to print address labels. To improve efficiency, we use "3 across" labels (each sheet of labels is three labels wide). The General Manager does not have the capability to print more than one label across the page. This is a compromise which is also a minor disadvantage.

Since I didn't have any major questions, there was no need to call On–Line Systems product support line. I know from past experience that On–Line Systems is eager to work with users, so I have every confidence that they would be helpful if the need arose. After completing this review, I received a call from Paul Malachowski, one of the program's authors. He was very eager to solve the printing "problem" above, and satisfied me that I'd missed something in the instruction manual.

The program consists of a notebook–type manual (187 pages), a copy–protected "master program disk", and two other dual–sided disks which contained: a second protected copy of the master program, a copyable "working program disk" (for use after the master disk, it has all but that small amount of data required to protect the author's copyright), a disk containing all the screen "forms," and a sample data disk for learning the program. It requires a 48K Apple with Applesoft (ROM, language card, or firmware card), one or two drives, and DOS 3.3 Options include a printer, clock card, and shift–key modification. An eighty–column card option would be *very* helpful, in that more information could be included in each data screen. It would also eliminate the problem in legibility caused by backspacing over lowercase letters. The authors of The General Manager are Kevin Cooper and Paul Malachowski.

A **Call -A.P.P.L.E.** TECHNIQUE:

FAST 6502 MULTIPLICATION

Damon Slye

MULTIPLICATION is a very fundamental mathematical operation. Therefore, it is employed quite frequently within computer programs. Furthermore, for programs which do a large amount of arithmetic processing and require a high execution speed, fast multiplication is imperative. Flight simulators, for example, must perform countless multiplications very quickly. Slow multiplication will result in slow animation and a failure to simulate real-time flight. The 80-20 rule in computer science observes that for many programs, 80% of execution time is spent within 20% of the code. Now, if a large portion of that 20% is made up of multiplications, then the speed of the multiplication routines has a dramatic effect on the speed of the overall program.

Since the 6502 lacks hardware multiplication, software multiplication routines were developed. Unfortunately, the routines developed are not the fastest possible. This article will amend and improve the standard routines. Presented here are the fastest 6502 multiplication routines in existence. These routines have never before been published (Remember, you read it here . . .).

Figure 1 is a standard 8 by 8 bit multiplication routine. On entry, the X-reg holds the multiplicand, and the A-reg holds the multiplier. On exit, the A-reg holds the high eight bits of the result, and the X-reg holds the low eight bits. During execution, the three locations CAND, PLIER, and RESL are used to hold the multiplicand, the multiplier, and the result low.

This standard routine multiplies in the same way binary multiplication is done with paper and pencil. The low bit of PLIER is multiplied by CAND to form a partial product. This partial product is added to the result, and the result is then shifted down one bit. The process is repeated for each of the other seven bits in PLIER (For a comprehensive tutorial on 6502 multiplication, see *Programming the 6502,* by Rodnay Zaks, or *6502 Assembly Language Programming,* by Lance A. Leventhal).

The routine is 24 bytes long. On the Apple's 1 MHz 6502, it takes from 178$_{\mu}$s to 210$_{\mu}$s, averaging 194$_{\mu}$s. Several articles have stated that 200$_{\mu}$s is probably close to the maximum speed for 6502 multiplication. As we shall see, that isn't true.

The standard multiplication appears very efficient. The loop is clean and tight. But can we improve it? When studying loops, it is useful to note any loop invariants. That is, conditions which are always true within the loop. For instance, immediately prior to executing CLC/ADC CAND, we know the carry is set. For if it had been clear, we would have branched around the addition due to the BCC NOADD. We can use this loop invariant to improve execution speed. If we decrement CAND before executing the loop, we will not need to CLC, since (carry clear) + CAND = (carry set) + (CAND-1). We save 2$_{\mu}$s every time CAND is added to the result. Another loop invariant is that when we shift PLIER right with LSR PLIER, a bit position on the left of PLIER becomes available. Also, each time we iterate the loop, Result low shifts right, and requires a bit position on the left of RESL. We will be able to combine LSR PLIER and ROR RESL into one statement. This will save 5$_{\mu}$s for each loop iteration.

Figure 1

```
MULT    STX   CAND       ;Save multiplicand
        STA   PLIER      ;Save multiplier
        LDA   #0         ;Result hi := 0

        LDX   #8         ;DO FOR 8 bits
LOOP    LSR   PLIER      ;   IF next bit of PLIER = 0
        BCC   NOADD      ;      THEN no addition
        CLC              ;      ELSE add CAND to the result
        ADC   CAND

NOADD   ROR   ;Shift the result down 1 bit
        ROR   RESL
        DEX
        BNE   LOOP

        LDX   RESL
        RTS
```

Now take a look at our improved routine, FAST8X8 (listing 1). Note that we decremented the multiplicand (DEX) prior to executing the loop. However, we first had to insure that the multiplicand wasn't zero. If we decrement zero we get 255. Result + 255 + (carry set) would generate a false carry. Therefore, if the multiplicand is zero, we avoid executing the loop by branching away to ZERO. Observe the second change: PLIER now holds both PLIER and RESL. ROR PLIER simultaneously shifts PLIER down a bit and shifts the low bit of RESL into the carry. We had to shift PLIER right once before executing the first iteration of the loop. FAST8X8 is 29 bytes long and takes from 146 to 162$_{\mu}$s, averaging 154$_{\mu}$s. This is 20% faster than the standard routine. But wait, there is yet another technique which can be used to accelerate execution speed. If we unwrap the loop by actually writing it out eight times, we can avoid *decrementing* and testing the loop counter (DEX/BNE LOOP). To unwrap, replace the entire body of the loop (lines 58-64) with with Figure 2. Unwrapping the loop

Figure 2

```
                    BCC   NOADD1           ;Iteration #1
                    ADC   CAND
        NOADD1      ROR
                    ROR   PLIER
                    BCC   NOADD2           ;Iteration #2
                    ADC   CAND
        NOADD2      ROR
                    ROR   PLIER
                          "
                          "
                          "
                    BCC   NOADD8
                    ADC   CAND
        NOADD8      ROR
                    ROR   PLIER
```

expands the program to 73 bytes, but it also increases the execution speed. The unwrapped version averages 113µs, which is 40% faster than the standard routine.

These techniques which speed up 8 by 8 bit multiplication can also be applied to 16 by 8 and 16 by 16 bit multiplication. FAST16X8 (listing 2) averages 251µs. If it were unwrapped, it would average 211µs. In FAST16X8, the technique of decrementing the multiplicand to avoid the CLC wasn't used since it would have actually slowed execution (decrementing a two byte number consumes at least 11µs). Finally, a 16 by 16 bit multiplication is presented (listing 3). FAST16 is similar to the "MUL" routine in the integer monitor in that it computes the value CAND*PLIER + RESH,L. Therefore, to do straight multiplication, the calling program should zero RESH,L before invoking FAST16. MUL in the integer monitor averages 1223µs, whereas FAST16 averages 559µs. The size and timing of each of the multiplication routines is summarized in table 1. It can be seen that there is a trade off of size for speed. The unwrapped version of FAST16 is comparatively large. Optionally, we could partially unwrap FAST16. That is, instead of writing the loop out 16 times and executing it once, we write it out eight times and execute it twice. Or, we write it out four times and execute it four times. This would save considerable space and would cost very little time. For instance, the 4 by 4 version would be 94 bytes long, and would average 499µs, a trade of 60 bytes for 60µs.

I have also developed some improved division routines. They may be presented in a future article. The fast multiplication routines were developed in response to a need for quick object rotation, point projection, line clipping, and line drawing within in a 3D graphics module I wrote. I estimate that the improvement of the multiplication and division routines has increased execution

sion routines has increased execution

speed of the module by 25%. This has raised the animation rate from 8 frames/sec to 10 frames/sec.

I feel that there are many programs which would benefit from these improved routines. Programs which do intensive multiplying will be considerably faster by incorporating these routines. They certainly form a nice enhancement to a user's library of machine language utilities.

```
        ***********************************
        *                                 *
        * THREE FAST MULTIPLY ROUTINES    *
        *        by Damon Slye            *
        *                                 *
        * Call -A.P.P.L.E. : Jun. 1983    *
        *                                 *
        ***********************************

        CAND     =     0              ;Multiplicand
        PLIER1   =     1              ;Multiplier
        CANDL    =     0              ;Multiplicand (lo)
        CANDH    =     1              ;Multiplicand (hi)
        PLIER    =     2              ;Multiplier
        PLIERL   =     2              ;Multiplier
        PLIERH   =     3
        RESM     =     3              ;Result (middle 8 bits)
        RESL     =     4              ;Result
        RESH     =     5

        *
```

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TABLE 1:
Time and Size summary

ROUTINE	TIME (us)	SIZE (bytes)
STANDARD 8X8	194	24
FAST8X8	154	29
UNWRAPPED 8X8	113	73
STANDARD 16X8	327	43
FAST16X8	251	35
UNWRAPPED 16X8	211	156
APPLE MUL	1223	30
FAST16	559	34
UNWRAPPED 16X16	479	329
UNWRAPPED 4 times	499	94

```
                 **********************************
                 *                                *
                 * Listing 1: FAST 8X8 MULTIPLY   *
                 *                                *
                 * FAST8X8 quickly performs 8X8   *
                 *  bit multiplication.           *
                 *                                *
                 * ENTRY:                         *
                 * X-reg holds the multiplicand   *
                 * A-reg holds the multiplier     *
                 *                                *
                 * EXIT:                          *
                 * A-reg, X-reg hold the result   *
                 *  (high and low).               *
                 *                                *
                 * TIME:                          *
                 * 146-162 cycles- AVERAGE: 154   *
                 *                                *
                 **********************************


                          ORG   $300


0300: E0 00      FAST8X8  CPX   #0          ;Test if CAND = 0
0302: F0 17               BEQ   ZERO

0304: CA                  DEX               ;Decrement CAND to avoid
0305: 86 00               STX   CAND        ;  the CLC before ADC CAND.

0307: 4A                  LSR               ;Shift out lo bit for
0308: 85 01               STA   PLIER1      ;  the first iteration.

030A: A9 00               LDA   #0          ;Result hi := 0

030C: A2 08               LDX   #8          ;DO FOR 8 bits--
030E: 90 02      LOOP     BCC   NOADD       ;  Test lo bit of PLIER1
0310: 65 00               ADC   CAND
0312: 6A         NOADD    ROR               ;  Shift the result down 1 bit &
0313: 66 01               ROR   PLIER1      ;    shift next bit of PLIER1 out.
0315: CA                  DEX
0316: D0 F6               BNE   LOOP

0318: A6 01               LDX   PLIER1      ;X-reg := result lo
031A: 60                  RTS

031B: 8A         ZERO     TXA               ;Result hi,lo := 0
031C: 60                  RTS

                          DS    3           ;Force new ORG

                 *******************************
                 *                             *
                 * Listing 2: FAST 16X8 MULT.  *
                 *                             *
                 * FAST16X8 quickly performs   *
                 *  16X8 bit multiplication.   *
                 *                             *
                 * ENTRY:                      *
                 * CANDL,H hold the multi'cand *
                 * A-reg holds the multiplier  *
                 *                             *
                 * EXIT:                       *
                 * A-reg, X-reg, Y-reg hold the *
                 *  result (high and low).     *
                 *                             *
                 * TIME:                       *
                 * 183-319 cycles- AVERAGE: 251 *
                 *                             *
                 *******************************


0320: 4A         FAST16X8 LSR               ;Shift out lo bit for
0321: 85 02               STA   PLIER       ;  the first iteration

0323: A9 00               LDA   #0          ;Result hi := 0
0325: 85 03               STA   RESM        ;Result mid := 0
```

```
0327: A2 08             LDX   #8        ;DO FOR 8 bits--
0329: 90 0B    LOOP1    BCC   NOADD1
032B: A8                TAY             ;  Save result hi
032C: 18                CLC             ;  Add multiplicand to result
032D: A5 03             LDA   RESM
032F: 65 00             ADC   CANDL
0331: 85 03             STA   RESM
0333: 98                TYA             ;  Restore result hi
0334: 65 01             ADC   CANDH

0336: 6A       NOADD1   ROR             ;  Shift the result down 1 bit &
0337: 66 03             ROR   RESM      ;     shift next bit of PLIER out.
0339: 66 02             ROR   PLIER
033B: CA                DEX
033C: D0 EB             BNE   LOOP1

033E: A6 03             LDX   RESM      ;X-reg := result mid
0340: A4 02             LDY   PLIER     ;Y-reg := result lo
0342: 60                RTS

                        DS    13        ;Force new ORG

               ***********************************
               *                                 *
               * Listing 3: FAST 16 MULTIPLY     *
               *                                 *
               * FAST16 quickly performs         *
               *  16X16 bit multiplication.      *
               *                                 *
               * ENTRY:                          *
               * CANDL,H hold the multi'cand     *
               * PLIERL,H hold the multiplier    *
               *                                 *
               * EXIT:                           *
               * RESH, RESL, PLIERH, PLIERL      *
               *  hold the result.               *
               *                                 *
               * TIME:                           *
               * 423-695 cycles- AVERAGE: 559    *
               *                                 *
               ***********************************


0350: 46 03    FAST16   LSR   PLIERH    ;Shift out lo bit for
0352: 66 02             ROR   PLIERL    ;  the first iteration

0354: A5 05             LDA   RESH      ;A-reg will hold result hi

0356: A2 10             LDX   #16       ;DO FOR 16 bits--
0358: 90 0B    LOOP2    BCC   NOADD2
035A: A8                TAY             ;  Save result hi
035B: 18                CLC             ;  Add multiplicand to result
035C: A5 04             LDA   RESL
035E: 65 00             ADC   CANDL
0360: 85 04             STA   RESL
0362: 98                TYA             ;  Restore result hi
0363: 65 01             ADC   CANDH

0365: 6A       NOADD2   ROR             ;  Shift the result down 1 bit &
0366: 66 04             ROR   RESL      ;     shift next bit of PLIER out.
0368: 66 03             ROR   PLIERH
036A: 66 02             ROR   PLIERL
036C: CA                DEX
036D: D0 E9             BNE   LOOP2

036F: 85 05             STA   RESH
0371: 60                RTS


--End assembly--

114 bytes

Errors: 0
```

CP/MAGIC:

NIBBLING AWAY AT CP/M

Murray Arnow/Call —A.P.P.L.E. staff writer

APPLE CP/M is probably the the least documented of the operating systems available to Apple users. With this in mind, I hope to share some of the information I have been able to gather on the Z-80 SoftCard and the associated Microsoft implementation of CP/M. Before I begin, let me urge the reader to refer to the series of articles by Gregg Tibbetts in *Softalk* magazine titled SoftCard Symposium. The latter series is a mine of information if the reader has the patience to pursue the clues on the internal CP/M workings so enticingly strewn about by Mr. Tibbetts.

Probably the most confusing aspect of CP/M to individuals who are familiar with Apple DOS is the way the disk is accessed. This article will attempt to give some insight into CP/M disk I/O through descriptions and examples. CP/M was first created to run on standard IBM 8″ floppy disks. These disks have 77 tracks with 26 sectors per track. Each sector contains 128 bytes, as opposed to the Apple disks whose sectors contain 256 bytes. To maintain compatibility between the CP/M versions and the various CP/M implementations, all disk operations are performed using a "logical sector" containing 128 bytes. Since most 5¼″ disks use 256 byte sectors, the BIOS (basic input/output system) must make the translation between the "physical" and logical sectors.

A historical artifact appears on CP/M disks. The disk when formatted has the empty sectors filled with E5's. You may recall that when Apple DOS formats a disk the empty sectors are filled with the null character 00. The E5 of CP/M is the IBM EBCDIC symbol for a space. CP/M uses E5's in other areas as null characters.

As mentioned above, CP/M reads and writes to the disk in terms of 128 byte logical sectors. The Apple disk, however, is formatted in 256 byte physical sectors. The way that the Apple CP/M BIOS handles this is to use Z-80 code to manipulate the logical sectors and do the physical sector disk I/O in 6502 code; i.e., the RWTS subroutine is written in 6502 code. The RWTS subroutine in all the versions of Microsoft CP/M is located at $E03 (Note: addresses used by the 6502 will be prefixed by a $; addresses used by the Z-80 will be suffixed by an H, such as, 0FF380H). The CP/M RWTS subroutine is very similar to the one used by DOS 3.3 with the major difference in the sector skewing.

Sector skewing, also called sector interleaving, is a method to reduce the time of disk I/O. Some time is required after a sector is read to translate the encoded disk nibbles and store the results in the memory. If the sectors were sequential, the disk will have passed the next sector to be read resulting in one disk revolution for each sector reading. By changing the sector sequence such that when the computer has completed storing the data from the previous read, the disk head is over the next sector to be read, more than one sector can be read before the disk makes one revolution. Skewing also reduces disk write time because before data can be written to a sector it must be encoded, another time consuming process. Skewing permits the disk head to be over the next sector to be written to before the disk makes one revolution. Apple disks are formatted with the physical sectors appearing sequentially on the disk. The sector skewing is done in software. This means that if you ask DOS 3.3 for sector 1, you will actually be reading physical sector 7. The CP/M RWTS subroutine will give you physical sector 8 if you ask for sector 1. Table 1 relates various Apple sectorings.

. . . about the author

Murray Arnow is a physicist who has a somewhat unconventional work history. His time has been shared nearly equally between university appointments and industrial positions. While at the university his responsibilities included teaching physics and doing experimental research in an area of atomic physics which didn't seem to hold a great deal of interest for most of his colleagues. Interleaved with his academic appointments, he has worked for companies which make military radar, color picture tubes and CAT Scanners, the latter product being associated with his current position.

The nature of Arnow's work frequently requires that data be collected and analyzed. This often means that he has to build and interface a variety of electronic equipment to fill this need. He has interfaced the Apple to devices ranging from point plotters to oscilloscopes to aid in the collection and analysis of data.

A large portion of his spare time is spent fiddling with the Apple. In the process he has become quite well acquainted with both DOS and CP/M. Arnow also finds himself becoming more dependent on the Apple as a text processor for both correspondence and technical paper writing.

Table 1.
Apple Sector Skewing Relations

CP/M RWTS Sectors	CP/M Logical Sectors	DOS 3.3 Sectors	Physical Sectors
0	00,01	0	0
1	0C,0D	E	8
2	18,19	D	1
3	04,05	C	9
4	10,11	B	2
5	1C,1D	A	A
6	08,09	9	3
7	14,15	8	B
8	16,17	7	4
9	02,03	6	C
A	0E,0F	5	5
B	1A,1B	4	D
C	06,07	3	6
D	12,13	2	E
E	1E,1F	1	7
F	0A,0B	F	F

NIBBLING AWAY AT CP/M

Apple CP/M uses the RWTS subroutine directly in warm and cold boots. After booting, the RWTS subroutine is used as part of a more complex disk operating system. A detailed description of how to use the CP/M RWTS subroutine for disk I/O is included in the program CPMRWTS. CPMRWTS is intended for instructional purposes and is not recommended for use in disk access. The reason is that Microsoft is under no obligation to locate the RWTS subroutine at $E03 or are they obligated to maintain its structure in later CP/M versions. This is no real problem because direct disk access can be attained through the BIOS entry points. These entry points are standardized between all CP/M versions, and there is no need to fear alterations.

CP/M uses the BIOS entry points when doing standard disk I/O to the data tracks. A description of the subroutines used follows:

SETDMA:	The DMA (disk memory access) address is set. This is the 128 byte read/write buffer.
SELDSK:	The drive is selected for the next I/O.
SETTRK:	The disk track is selected for the next I/O.
SETSEC:	The disk sector is selected for the next I/O. The sector is usually the physical sector, but for the case of Apple CP/M it is the logical sector.
SECTRAN:	This subroutine calculates the skew relating logical to physical sectors. The input of a logical sector results in the output of the appropriate physical sector for use in SETSEC. For the Apple CP/M, the output is the same as the input.
READ:	The selected track/sector is read from the disk in the selected drive to the DMA buffer.
WRITE:	The DMA buffer is written to the selected track/sector on the disk in the selected drive.

A more complete description of the BIOS entry points may be found in the CP/M Alteration guide available from Digital Research.

Before giving an example of disk I/O using the BIOS entry points, a brief description of the disk formatting and the internal operations of the READ and WRITE subroutines will be found useful. Apple CP/M track numbers are identical to the DOS 3.3 track numbers, but the sector numbering needs some elaboration. There are 32 logical sectors on each track. The even numbered logical sectors occupy the first 128 bytes of a physical sector, and the odd numbered logical sectors occupy the last 128 bytes of a physical sector. Table 1 details the logical sector relations.

We know that the CP/M RWTS subroutine does the I/O to the physical sectors. We also know that the RWTS I/O buffer contains 256 bytes and that the logical sectors contain 128 bytes. It is extremely inefficient to require a physical read or write each time we wish to read or write to a logical sector. Since the RWTS I/O buffer after a read contains two consecutive logical sectors, the procedure used by the BIOS READ subroutine is to perform a physical read only if the previous read was not from the same physical sector. If the read was from the same sector, the appropriate RWTS I/O buffer half is transferred as a logical sector to the DMA buffer. In any case a call to READ will put the appropriate logical sector in the DMA buffer. The problem is even more complicated when we wish to write a logical sector.

CP/M 2.xx requires that a protocol be followed by the BIOS so that the BDOS (Basic Disk Operating System) can use a very efficient disk write procedure. The protocol states that prior to calling the subroutine WRITE the Z-80 C register should contain one of the following values: C=0 if the write is to a previously allocated sector or to a sector other than the directory area or the first sector of an unallocated block; C=1 if the write is to a directory sector; C=2 if the write is to the first sector of an unallocated block. A block (or group) in the case of Apple CP/M is 8 logical sectors. The protocol tells the BIOS what bookkeeping system to use. This avoids unnecessary pre-reads to fill half the I/O buffer and unnecessary writes if the I/O buffer doesn't have to be cleared. In simpler terms, when the C register contains a 0 or a 2, the write operation may be delayed until another write to a different logical sector is requested, and when the C register contains a 1 (or an odd number in the Apple CP/M), the DMA buffer is written immediately to the disk.

Table 2.
Jump table to BIOS entry points.

```
JMPTBL:     JMP  BOOT     ;Cold start.
JMPTBL+3:   JMP  WBOOT    ;Warm start. This is the location
                          ;jumped to from 0000H.
JMPTBL+6:   JMP  CONST    ;Console status check.
JMPTBL+9:   JMP  CONIN    ;Console input.
JMPTBL+12:  JMP  CONOUT   ;Console output.
JMPTBL+15:  JMP  LIST     ;List device output.
JMPTBL+18:  JMP  PUNCH    ;Punch device output.
JMPTBL+21:  JMP  READER   ;Reader device input.
JMPTBL+24:  JMP  HOME     ;Home selected disk drive head.
JMPTBL+27:  JMP  SELDSK   ;Select disk drive.
JMPTBL+30:  JMP  SETTRK   ;Set track number.
JMPTBL+33:  JMP  SETSEC   ;Set sector number.
JMPTBL+36:  JMP  SETDMA   ;Set disk memory access address.
JMPTBL+39:  JMP  READ     ;Read a selected sector.
JMPTBL+42:  JMP  WRITE    ;Write to a selected sector.
JMPTBL+45:  JMP  LISTST   ;Return the status of the list device.
JMPTBL+48:  JMP  SECTRAN  ;Translate logical to physical sectors.
```

The BIOS entry points are found by first locating the table of "jump vectors." The jump table is pointed to by the "warm boot" jump at location 0000H. The jump table, see Table 2, starts at location JMPTBL which for CP/M 2.xx versions is always at a memory page boundary. For the case of the 60K memory configuration of CP/M version 2.23, JMPTBL has the value 0FA00H.

Standard CP/M protocol requires that the track and sector subroutines must be called prior to each READ or WRITE. Some CP/M systems make a call to SETTRK and SETSEC optional after the first call if the sectors to be accessed haven't changed from the previous I/O command, Apple CP/M is such a system.

Not all CP/M systems require a call to SECTRAN to translate logical to physical sectors. The Apple skew is calculated in the RWTS, READ, and WRITE subroutines; hence, a call to SECTRAN is not required. Rules governing disk access for CP/M systems not requiring SECTRAN are as follows:

1) The read/write buffer should be selected by placing the buffer address in register BC and calling SETDMA. The buffer space requires 128 bytes.
2) The disk drive should be selected by loading register C with the drive value, 0 for A:, 1 for B:, etc., and calling SELDSK.
3) The track is selected by placing the track number in register BC and calling SETTRK. Apple CP/M requires the track to be in register C only, register B is ignored.
4) The logical sector is selected by placing the sector number in register BC and calling SETSEC. Apple CP/M requires the sector to be in register C only, register B is ignored.
5) Calling READ reads the selected sector from the selected drive to the read/write buffer. After a read an error code is stored in register A; 0 = no errors; 1 = non–recoverable error occurred.
6) Calling WRITE writes the contents of the read/write buffer to the selected sector and drive. The error codes stated for READ apply.

I'll close this article with the program TURNKEY which demonstrates the use of the CP/M disk I/O routines. To use TURNKEY type TURNKEY command; for example, TURNKEY DIR B:. The disk in drive A: is updated to perform the command upon a cold start. The example will have the directory of the disk in drive B: displayed when the system is booted.

```
;                             CPMRWTS
;                          by M. Arnow
;
;
;                                A routine to directly access physical
;                                sectors on a Microsoft Apple II CP/M disk.
;                                     CP/M RWTS sectors must be used.
;
;To use RWTS subroutine the following locations must be initialized:
;
TRACK EQU         0F3E0H  ;CURRENT TRACK
SECTOR EQU        0F3E1H  ;CURRENT SECTOR
CURVOL EQU        0F3E2H  ;CURRENT VOLUME (NOT USED)
LSTVOL EQU        0F3E3H  ;LAST VOLUME (NOT USED)
DRIVE EQU         0F3E4H  ;CURRENT DRIVE (01 OR 02)
LSTDRV EQU        0F3E5H  ;LAST DRIVE
SLOT EQU          0F3E6H  ;CURRENT SLOT (TIMES 16)
LSTSLT EQU        0F3E7H  ;LAST SLOT (TIMES 16)
BUFFER EQU        0F3E8H  ;BUFFER ADDRESS (LOW BYTE,HIGH BYTE)
                          ;CAUTION 6502 MEMORY OFFSET MUST BE USED
                          ;e.g., USE 0800H FOR LOCATION 0F800H
ERROR EQU         0F3EAH  ;ERROR CODE
                          ; 000H = NO ERROR
                          ; 010H = WRITE PROTECT ERROR
                          ; 040H = DRIVE ERROR
CMND EQU          0F3EBH  ;COMMAND CODE
                          ; 01 = READ
                          ; 02 = WRITE
;
RWTS$ EQU         00E03H  ;LOCATION OF 6502 RWTS  SUBROUTINE
Z$CPU EQU         0F3DEH  ;LOCATION OF SOFTCARD GOES HERE
A$VEC EQU         0F3D0H  ;ADDR OF 6502 SUB. TO CALL GOES HERE
;
;For the          proper operation of CP/M after using CPMRWTS, BUFFER must be
;restored to      0800H.
;
CPMRWTS:PUSH H            ;SAVE H,L REGISTERS
     LXI          H,RWTS$ ;PUT 6502 SUB ADDRESS IN A$VEC
     SHLD         A$VEC
     LHLD         Z$CPU   ;GET SOFTCARD ADDRESS
     MOV          M,A     ;JUMP TO 6502 SUBROUTINE
     POP          H       ;RESTORE H,L REGISTERS
     RET
```

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Circle 16 on Reader Service Card

NIBBLING AWAY

```
;                   TURNKEY
;                 by M. Arnow
;
;     A           program to convert the disk in
;     in          drive A: into a turnkey system.
;
WBOOT EQU         0             ;Warm boot entry point
BDOS EQU          5             ;BDOS entry point
CMNDBUF EQU       80H           ;Buffer holding
                                ;tail of CCP command
                  ;
      ORG         100H
                  ;
                  ;Create local jump table for disk I/O.
                  ;
      LHLD        WBOOT+1       ;Load jump table addr.
      LXI         D,27          ;Load SETTRK offset
      DAD         D             ;HL points to SETTRK
      LXI         D,SETTRK      ;DE points to local
                                ;SETTRK
      LXI         B,15          ;Move routines with
      DB          0EDH,0B0H     ;Z-80 LDIR
                  ;
      MVI         C,0DH         ;Reset disk system
      CALL        BDOS
                  ;
      LXI         B,BUFFER      ;Set I/O buffer
      CALL        SETDMA
                  ;
                  ;Read track/sector 0/1A
                  ;
      MVI         C,0           ;Set the track = 0
      CALL        SETTRK
      MVI         C,1AH         ;Set the sector = 1A
      CALL        SETSEC
      CALL        READ          ;Read the sector
                                ;to BUFFER
                  ;
      LXI         D,BUFFER+7    ;DE points to byte
                                ;7 in BUFFER
      LXI         H,CMNDBUF     ;Put address of
                                ;command line buffer
                                ;in HL
      MOV         A,M           ;Get the number of
                                ;buffer characters
      STAX        D             ;Place number in BUFFER
      ORA         A             ;Check if number = 0
      JZ          UPDATE        ;Jump if true
      MOV         C,A           ;Save A
      DCR         A             ;Correct A to account
                                ;for leading blank
      STAX        D             ;Place number of
                                ;command characters
                                ;in BUFFER
      INX         D             ;DE points to BUFFER+13
      INX         H             ;Move command line
      INX         H             ;pointer to start of
                                ;TURNKEY command
      DB          0EDH,0B0H     ;Do a Z-80 LDIR
                                ;and move command
                                ;to BUFFER
                  ;
                  ;Write BUFFER to track/sector 0/1A.
                  ;
UPDATE: MVI       C,1           ;Set C to ensure
                                ;a physical write
      CALL        WRITE         ;Write BUFFER to
                                ;the sector
                  ;
      JP          WBOOT         ;Warm boot back
                  ;
                  ;Local BIOS entry jump table.
                  ;
SETTRK: DS        3             ;Select track
SETSEC: DS        3             ;Select sector
SETDMA: DS        3             ;Select I/O buffer
READ: DS          3             ;Read a sector
WRITE: DS         3             ;Write a sector
                  ;
BUFFER EQU        $             ;Start of I/O buffer
                  ;
      END
```

FROM THE HEART OF THE MONITOR:

MEMORY MOVES MADE SIMPLE

Ken Kashmarek

MORE than once, I have come across the need to move information in memory, in an efficient manner. More often than not, this involves moving text file data to or from a DOS buffer. While this can be done with a PEEK/POKE loop, it makes more sense to use the Monitor move routine. This routine is described in *Apple][Monitors Peeled* (Apple Computer, Inc.). It can be used from a BASIC program by POKEing the appropriate page zero locations and calling the routine.

To give you an idea of the time involved in memory moves, a PEEK/POKE loop to move High-Res page 1 to page 2 (8192 bytes) takes 58 seconds. This same loop coded with the two byte &PEEK/&POKE (February 1983, page 27) takes 36 seconds. The monitor move routine can move 32K in approximately 2.2 seconds.

The monitor move routine is located at $FE2C (65068, or -468) and must be called with the Y register set to zero. This is done by POKEing zero into the monitor SAVEY location and invoking the monitor routine to restore registers and JMP to the move routine:

```
10 A1 = 60:& POKE A1,512: REM
   set A1 ($3C/3D) = 512 ($0200)
20 A2 = 62:& POKE A2,767: REM
   set A2 ($3E/3F) = 767 ($02FF)
30 A4 = 66:& POKE A4,8192: REM
   set A4 ($42/43) = 8192 ($2000)
40 POKE 71,0: REM SAVEY ($47) =
   0 ($00)
50 PC = 58:& POKE PC,65068:
   REM PC ($3A/3B) = 65068
   ($FE2C)
60 CALL -327: REM call restore/
   jump routine
```

The above example moves the input buffer (page 2) to High-Res page 1. In the monitor, this command can be entered as "2000<200.2FFM" from the keyboard. Location A1 is the start address for the move. Location A2 is the end address, while location A4 is the target address. Locations 58/59 are the bytes used to store the program counter. After the registers are restored, this value is used in a JMP instruction.

The actual move routine at $FE2C is very short and consists of a load/store operation, a JSR to a routine to increment pointers ($FCB4) and a test for end of range. The routine at $FCB4 increments A4, sets the carry flag if the value for A1 is greater than or equal to A2, then increments A1 and returns to the move routine. The monitor move routine is a very compact 31 bytes in length.

The above BASIC routine is somewhat cumbersome to use due to the &POKE sequences (even more so with regular POKE). This routine could be made a general BASIC subroutine with variables set up for the memory addresses. However, it is much simpler to write an ampersand routine to perform this function. The command format for our new ampersand routine is:

& MOVE,source,target,length

where SOURCE indicates the starting memory location from which data is moved. TARGET indicates where the data is to be moved to, and LENGTH indicates the number of bytes to be moved (all can be expressions). LENGTH must be less than or equal to 32767.

Before proceeding, we must examine the monitor move routine in order avoid a potential trap. The monitor does not check the values in locations A1, A2, or A4 before or during the move. The move terminates when A1 is greater than or equal to A2. One byte is always moved, even if A1 starts off greater than A2. Now the real kicker: depending on the number of bytes moved, A4 can wrap around from the top of memory to page zero. If that happens, it is probably boot-up time (or boot yourself time).

```
]LIST

10  REM

SAMPLE MEMORY MOVE KEN KASHMAREK

  CALL -A.P.P.L.E. : JUNE 1983

30  HOME : PRINT "LOADING &MOVE R
     OUTINE TO PAGE 3"
50  GOTO 70
60 H$ = H$ + "ND9C6G": FOR I = 1 TO
     LEN (H$): POKE 511 + I, ASC
    ( MID$ (H$.I,1)) + 128: NEXT
    : POKE 72.0: CALL  - 144: RETURN

70 H$ = "0300:A9 0B 8D F6 03 A9 0
    3 8D F7 03 60 C9 4D D0 62 20
     B1 00 C9 4F D0 5B 20 B1 00
    C9 56 D0 54 20 B1 00 C9 45 D
    0 4D 20 B1 00 20 BE DE 20 67
     DD 20 52 E7 84 3C 85 3D 20
    BE DE 20 67 DD 20 52 E7 84 4
    2 85 ": GOSUB 60
80 H$ = "0340:43 20 BE DE 20 67 D
    D 20 52 E7 AA 30 21 A0 00 C6
     50 A5 50 C9 FF D0 04 C6 51
    30 12 B1 3C 91 42 E6 3C D0 0
    2 E6 3D E6 42 D0 E6 E6 43 D0
     E2 60 4C 99 E1 4C C9 DE ": GOSUB
    60
90  POKE 1014,11: POKE 1015.3: REM
     SET UP AMPERSAND VECTOR
100 P1 = 8192:P2 = 16384:A = 128:
    B = 40:L = 8192: HOME
105  REM CLEAR HIRES PAGE 1 AND 2

110  POKE P1,0: & MOVE,P1,P1 + 1,
    L - 1: & MOVE,P1,P2,L
115  REM POKE HCOLOR=1
```

MEMORY MOVES MADE SIMPLE

Since this is probably not too desirable, we should consider coding our own memory move routine with some safeguards in it. The &MOVE routine listing provides the result. Page 3 is used for this 116 byte program. Lines 29–33 set up the ampersand vector when the program is BRUN. Lines 34–45 decode the MOVE command. Lines 46–79 can easily be placed in an ampersand routine with the command decode routine from PRINT USING & FRIENDS.

Lines 46–61 decode the input arguments and set up memory pointers. A maximum length of 32767 is used to avoid a complete wipe-out of memory, although such a large move to the wrong address will still probably destroy a system. A length count of zero (0) will not move any bytes. In addition, the target address is not allowed to wrap around ($FFFF to $0000, checked in line 76). The move stops at that point to avoid destroying page zero locations. If page zero bytes are to be changed, the target address must begin in page zero ($00–$FF, or 0–255).

An area of memory can be cleared with:

POKE 8192,0
& MOVE,8192,8193,8191

which clears High-Res page 1. High-Res page 2 can be moved to page 1 (or vice versa) with:

& MOVE,16384,8192,8192:REM page 2 to page 1
& MOVE,8192,16384,8192:REM page 1 to page 2

Now, memory tables can be moved around with ease from Applesoft programs. Added protection could be implemented by checking for addresses from 2048 to 38400 to avoid destroying DOS or page zero. Beware of moves which might cross the I/O page ($C000).

The code in lines 62–77 is 31 bytes long, matching the monitor move routine, although the setup code makes the entire module longer. This loop is actually slightly faster than the monitor routine (1.6 seconds to move 32767 bytes). An exercise for the reader is to determine why (an answer will be published in a future issue). The sample program illustrates some uses of &MOVE.

```
120  HGR : POKE P1,42: & MOVE,P1,
     P1 + 1,L - 1: FOR J = 1 TO 5
     00: NEXT
125  REM POKE HCOLOR=2
130  POKE P1,85: & MOVE,P1,P1 + 1
     ,L - 1: FOR J = 1 TO 500: NEXT

135  REM CORRECT HCOLOR=1
140  POKE P1,42: POKE P1 + 1,85: &
     MOVE,P1,P1 + 2,L - 2: FOR J =
     1 TO 500: NEXT
145  REM CORRECT HCOLOR=2
150  POKE P1,85: POKE P1 + 1,42: &
     MOVE,P1,P1 + 2,L - 2: FOR J =
     1 TO 500: NEXT
155  REM HCOLOR=5, TOP DOWN
160  HGR2 : POKE P2,170: POKE P2 +
     1,213: & MOVE,P2,P2 + 2,B -
     2
170  FOR J = 0 TO 2:X = P2 + J *
     B: FOR N = 0 TO 7: FOR I = N
      TO N + 56 STEP 8
180  & MOVE,P2,X + I * A,B: NEXT
     I,N,J
185  REM EYE TESTER
190  FOR I = 1 TO 5:X =  PEEK (49
     236): FOR J = 1 TO 500: NEXT
      :X =  PEEK (49237): FOR J =
     1 TO 500: NEXT : NEXT
200  HOME : TEXT : HTAB 10: PRINT
     "I LOVE THIS COLOR": HGR
205  REM HCOLOR=6, BOTTOM UP
210  POKE P2,213: POKE P2 + 1,170
      : & MOVE,P2,P2 + 2,B - 2
220  FOR J = 2 TO 0 STEP  - 1:X =
     P1 + J * B: FOR N = 7 TO 0 STEP
      - 1: FOR I = N + 56 TO N STEP
      - 8
230  & MOVE,P2,X + I * A,B: NEXT
     I,N,J
```

```
:ASM
        ********************************
2       *                              *
3       *     Memory Move Routine      *
4       *      by  Ken Kashmarek       *
5       *                              *
6       * Call -A.P.P.L.E. : June 1983 *
7       *                              *
        ********************************
9       *                              *
10      * Function: move bytes from 1  *
11      * Location to another.         *
12      * Usage 100 &move,A,B,C        *
13      * Where A=source address       *
14      *       B=target address       *
15      *       C=len (max 32767)      *
16      *                              *
        ********************************
18      SOURCE   EQU  $3C          ;Source ptr
19      TARGET   EQU  $42          ;Target ptr
20      LINNUM   EQU  $50          ;Work area
21      CHRGET   EQU  $00B1        ;Chr get
22      AMPV     EQU  $03F5        ;Ampersand
23      FRMNUM   EQU  $DD67        ;Compute exp
24      CHKCOM   EQU  $DEBE        ;Check for ,
25      SYNTAX   EQU  $DEC9        ;Syntax error
26      QTYERR   EQU  $E199        ;Qty error
27      GETADR   EQU  $E752        ;Fac->linnum
28               ORG  $0300
```

```
0300: A9 0B               LDA  #<MOVE       ;Lo byte
0302: 8D F6 03            STA  AMPV+1
0305: A9 03               LDA  #>MOVE       ;Hi byte
0307: 8D F7 03            STA  AMPV+2
030A: 60                  RTS
030B: C9 4D         MOVE  CMP  #'M'         ;Check out
030D: D0 62               BNE  OOPS
030F: 20 B1 00            JSR  CHRGET
0312: C9 4F               CMP  #'O'         ;The command
0314: D0 5B               BNE  OOPS
0316: 20 B1 00            JSR  CHRGET
0319: C9 56               CMP  #'V'         ;For "move"
031B: D0 54               BNE  OOPS
031D: 20 B1 00            JSR  CHRGET
0320: C9 45               CMP  #'E'         ;Do we have it
0322: D0 4D               BNE  OOPS
0324: 20 B1 00            JSR  CHRGET
0327: 20 BE DE            JSR  CHKCOM       ;Source ptr
032A: 20 67 DD            JSR  FRMNUM
032D: 20 52 E7            JSR  GETADR
0330: 84 3C               STY  SOURCE       ;Y->lo
0332: 85 3D               STA  SOURCE+1     ;A->hi
0334: 20 BE DE            JSR  CHKCOM       ;Target ptr
0337: 20 67 DD            JSR  FRMNUM
033A: 20 52 E7            JSR  GETADR
033D: 84 42               STY  TARGET       ;Y->lo
033F: 85 43               STA  TARGET+1     ;A->hi
0341: 20 BE DE            JSR  CHKCOM       ;Length value
0344: 20 67 DD            JSR  FRMNUM
0347: 20 52 E7            JSR  GETADR
034A: AA                  TAX               ;Test it
034B: 30 21               BMI  QERR         ;Too bad
034D: A0 00               LDY  #0           ;Offset
034F: C6 50         MVE0  DEC  LINNUM       ;Dec count
0351: A5 50               LDA  LINNUM
0353: C9 FF               CMP  #$FF         ;Wrap?
0355: D0 04               BNE  MVE1
0357: C6 51               DEC  LINNUM+1
0359: 30 12               BMI  MVE3         ;Done...
035B: B1 3C         MVE1  LDA  (SOURCE),Y   ;Source
035D: 91 42               STA  (TARGET),Y   ;Target
035F: E6 3C               INC  SOURCE       ;To next byte
0361: D0 02               BNE  MVE2
0363: E6 3D               INC  SOURCE+1
0365: E6 42         MVE2  INC  TARGET       ;To next byte
0367: D0 E6               BNE  MVE0
0369: E6 43               INC  TARGET+1
036B: D0 E2               BNE  MVE0         ;Die at 64k
036D: 60            MVE3  RTS
036E: 4C 99 E1      QERR  JMP  QTYERR       ;If len>32767
0371: 4C C9 DE      OOPS  JMP  SYNTAX       ;Goofed

--End assembly--

116 bytes

Errors: 0
```

REQUEST FOR CHANGE OF ADDRESS

Dear A.P.P.L.E.,

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ADDRESS ____________________________

CITY ______________________________

STATE ____________ ZIP CODE ____________

EFFECTIVE DATE ______________________

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ADDRESS ____________________________

CITY ______________________________

STATE ____________ ZIP CODE ____________

MEMBERSHIP NUMBER ___________________

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Unclassifieds cont. from page 80

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OUT OF THE RUT

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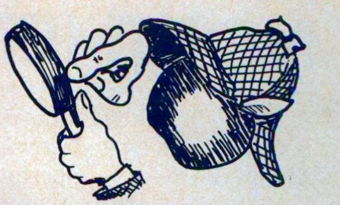
NORTHERN SPY



Rick Sutcliffe/Call —A.P.P.L.E. staff writer

“NORTHERN Spy” — a fine quality, crisp, late maturing red apple — is prone to scab in damp climates, but a good keeper. It has a sharp juicy flavor which sets up the taste buds and cleans the palate. Recommended for both snacks and pastries and, with the Gravenstein and Delicious, one of the all time favorites of home orchardists in the North.

Let us hope that is what this column can become — in the months ahead we will be trying to offer a provocative repast, a melange of tidbytes of news, views and programming ideas, with a definite lean to the more technical side of things. Readers are invited to join the discussion with one-liners, opinions and news items of their own. The deepest pieces will concentrate on Assembly Language and DOS, but Educational and Legal issues will also be discussed at some length. We will be nothing if not eclectic in this space. Some of you may pass us by occasionally when the material here drifts away from your interest areas, but for those who do sink in their teeth, we hope to deliver some of that tart, crisp flavor that lasts and lasts. One month, apple crisp — another time we'll take it raw, enjoying Apple flavor right to its very core.

NEWS — Good

Well, it really isn't (news, that is) any more, but the Apple *IIe* was the major new product at the Vancouver Office and Business machines show at the Hyatt Regency in January. The show began the same day that the *IIe* was introduced, so this was its very first showing anywhere.

I'd like to report that it had them all agog — but that just wasn't the case. Most of this crowd was attracted by the endless displays of PC equipment from International Big Mother. The “other folks” machine” and its imitators were on task in a wide variety of office environments and were getting most of the attention from the bright young men and women from nearby corporate headquarters.

As far as direct competition with these was concerned, I only saw one Apple /// which did not seem to be catching much of the interest of this briefcase crowd, though there were obviously a few enthusiasts present. Three local stores had the new *IIe* on display and their employees seemed to be spending most of the time talking to old Apple owners who had heard the word that the Big Announcement had been made right here and wanted to join in the making of history — perhaps even get a chance to hold one of the new babies. (Look Ma — ain't he cute; he's got so few chips it's like he was naked.) The pinstripers, on the other hand, seemed blissfully unaware of the significance of the big unveiling; few of them were paying much attention to the *IIe* displays — an indication that Apple has a long way to go in cracking open the office market.

A first for these parts was the presence of Apple Canada itself at the show, with a few more of the e's. Stopping here after a lengthy reconnaissance, I checked for suspicious characters hanging about, and when the coast was clear, I quickly snapped a box of diskettes from under my trenchcoat and made bold to “boot up” AMPERMANAGER on one of the shiny new e's. My amper utility package calls many routines with non-published entry points from the monitor, DOS and Applesoft for its own subprograms, and the big question was: “Would it run at all?”

I soon discovered that it would — and perfectly so. I knew at once that here was a winner; Apple had obviously achieved what amounted to near 100% software compatibility. The two things that I noticed right away, which will make life difficult for some people, are the lack of a place to strap most types of 16K RAM cards, (sell them with your old machine), and the lack of perfect compatibility with the many word processors which look for the old game paddle shift key modification (this baby has a real shift key). *Actually, the shift key mod can be done. . . ed.* Some fast rewrites are going to be done — and aren't software people going to be scrambling to take advantage of the new superslot 3? You can still use the plug in type RAM cards that do not require a motherboard strap in slots 1–7, but would probably be better off buying the slot 3 card with 64K of RAM from Apple. (Or, better still, wait for a four to six function card from someone else.) Modifying the shift key a la][+ would be silly, and as hard to do as on the Rev6 board. Sell that word processor with your old Apple and buy a new one.

To me, the biggest news of all was a machine that was not in evidence here — the LISA. Announced on the second day of the show, but as yet present in this country only for an Ottawa news conference, this new player in the game is “the franchise”. Given astronomical development costs, its failure would irreparably harm the Apple Computer Corporation. On the other hand, its success would move the Cupertino team ahead of the rest of the league by several games and for some time to come.

Actually though, Apple missed a golden opportunity here. Their booth faced that of Xerox across a narrow aisle, and who was there but LISA's older cousin STAR. Oh, to have seen those two face off against each other on the introduction day. . . the thought is too much. Ah, well, where's the next show?

VIEWS

But you've been waiting for my opinions, haven't you? You haven't? — well here they are anyway. The Northern Spy predicts that:

—●→

NORTHERN SPY

(1a) The *IIe* will outsell even the][+ and do so by a very wide margin. Many prospective purchasers have been holding off and even so, sales have been very strong in the last few months. Moreover, many of the hackers I know have already sold their "old" Apple and ordered a *IIe*. There are bargains out there, folks. Look for Apple to scramble to keep up with sales which will be in the 100,000+/month range for a while. My estimate is that up to a third of current Apple owners will upgrade within a year, with some electing to keep their old machines and go with two. (One to answer the doorbell and turn the lights on?)

(1b) There will be more revisions. There already exists a Rev B motherboard designed to improve graphics handling. High-Res graphics density is doubled, and some additional signals brought to slot 7 for an RGB color video board. I have been advised that Apple will make a no charge update after May 1 for RevA owners who also have the extended memory card.

(1c) We will soon see hardware manufacturers scrambling to fill that super slot 3 with 80 column, extra memory (256K?), clock, and I/O combination cards like those already being produced for the PC. You've only got one slot to spend, so you might as well make it a good one. (Again, be cautious about buying that Apple 64K card; you don't want to be stuck with something which is simply inadequate.)

(1d) Look for someone — perhaps Apple Computer? — to bring out an Apple /// emulator or for an early introduction by Apple of *IIe* compatible SOS. Features like the relocatable page zero, 80 column, extra 64K of memory, and access to timing signals make this one an obvious choice. Personally, I think that the /// will eventually be discontinued — absorbed into an expanded *IIe* or superseded by some bigger brother. (When? — well, Apples blossom in the spring . . . and remember — you saw it here first!)

(1e) Expect to see an expansion chassis soon to make several superslots available. (Perhaps from Mountain Hardware?)

(1f) Soon now, someone will start making Apple][+ add on boards to emulate the *IIe*. It shouldn't take long for several people to discover just which chips to pull to strap the right signals to an 80-column 64K card in good old ordinary slot 3 to work just like the *IIe*. Of course, you'd need a new ROM monitor, and some changes to the soft switches, but let us not say that it cannot be done — only that it might be difficult.

(1g) And speaking of add on boards, a number of co-processors should make an early debut. The presence of the timing signals and a timing override on this bus imply that any microprocessor chip could take over the memory and bus and supply its own timing signals. The 68000 may be out because there are only eight multiplexed address lines, but still — you buy an Apple today, but what will you have tomorrow?

(1h) Finally, the pirates will naturally have a go at the new motherboard. It should be possible to buy ripoffs of the new boards from electronics dealers by fall at the latest — the only reason it'll take that long is that the new custom LSI chips are going to be tough to copy. Please don't mistake my light tone for approval though. I do not think that simply stealing someone else's designs is either right in an absolute sense or that it benefits the rest of us in any way. However, if something can be made more cheaply, you can bet that it will be. More on this topic in a couple of months.

(2) Now what about the LISA? I haven't actually seen one yet, but from what I do know, I think that Apple has a vehicle here in which they could drive circles around the high end of the market for a year or more. Assuming that the kind of design problems which plagued the /// have not been repeated (and they couldn't be, could they?), this one sounds like a big winner. Prediction: While everybody else scrambles to catch up, Apple will take over this end of the market. My feeling is that the LISA will make Apple Computer Inc. more money than any comparable product on the market today.

(2b) Also, those beautiful LISA disk drives with the 860K of storage will probably become available separately with a *IIe* DOS 4.0 — call it "Pro-DOS" if you like — in the very near future. With this new setup, we could see the first major departure from Apple DOS as we have known it. This is because a current VTOC has room for 100 tracks in the usual arrangement, or perhaps for 108 with some re-ordering of the miscellaneous information at the beginning of the page. Simultaneously going to 512 bytes/sectors would yield the 84K of storage. However, the DOS buffers, including those high up in memory, would have to be doubled in size, forcing a rearrangement of all the routines. Alternatively, two sectors (256 bytes each) could be used for the VTOC, but this would also require many changes. So, there will be a retooling of the whole system with particular attention to speed enhancements. My guess is that we'll see this by the summer time, and that it will use a block-length sector of 512 bytes, enabling some simplifications to Pascal. (All the devotees say "Hooray".)

On the other hand, a two sided system could bring in only the VTOC needed for one side at a time, but this might amount to having separate drives, so far as contiguous storage space is concerned. I do not believe this to be an ideal solution — some of us have really *big* files and the prospect of having the whole 860K available at once makes our mouths water.

I am obviously speculating. The specs on the new drive would settle the issue of how it will be adapted to the *IIe*.

What else, while we are retooling DOS? (All this free advice — my goodness, I should charge Apple a consulting fee.) DOS 4.0 cannot be too long, so they do what should have been done long ago and scrap the INIT command altogether, replacing it with a separate program for formatting disks a la CPM and Pascal.

Perhaps INIT could simply be incorporated into a copy program; which could then be called with the DOS command COPY (same number of letters as INIT). DOS could demand that you insert a disk containing COPY and carry on from there. Keeping this facility separate would add a measure of security — particularly in institutional situations — by interposing another command level before actually formatting and destroying a disk.

For example, I could distribute the DOS code to my students and withhold the copy utility. This would keep control over initialization and hinder them from stealing software. Also, it frees up enough memory within DOS to double the size of the nibble buffers, if necessary, and rewrite some disk access routines for greater speed without increasing overall size. (DOS 3.3 is scandalously slow.) Many of my favorite entry points within DOS are sure to fall, but that's progress for you.

A more radical alternative would be to abandon DOS altogether in favor of SOS, but I consider that less likely, though a distinct possibility.

(3) We should see the McIntosh or a "super-hobbiest" machine this summer, once the dust has settled a bit on the *IIe* and LISA introductions.

(4) And finally, expect an Apple low-end entry later this year or early next year. It would be foolish indeed to continue to ignore the under $500 market, and the folks at Cupertino are no fools — at least not most of the time.

But, enough for this month. Looking now into our own future, what do we see in store for this column?

Well, if you have already bought the *Call -A.P.P.L.E.* Special #3 - All About DOS, then you have met my friend "Numbfingers" Nellie Hacker in the two pieces entitled "Rick's RELETEr" and "ROGRAM and other DOS Traps". [You haven't? — Run, do not walk. . .etc. etc.] You will therefore be thrilled to hear that she will be visiting this space soon as we tackle together the thorny issue of how to do partial INIT's of diskettes by patching into DOS.

For the following months, (DV) I shall discuss some creative error messages and sound off about software protection and piracy. Perhaps I'll also tell you about CPM60 sometime soon. In the works for a later date, (possibly spread over two months) is a comparison of the old and new Apple with the Franklin, Syscom, Pineapple, Basis and others — with some provocative comments on these types of copy cats and why they exist. I do hope to see you again.

WRITING THE WRONGS

the wrongdoers

THIS note is in regard to Edward So's Picture Compression program in the May 1982 issue, page 21. It is an excellent article and a very well designed and commented program. However, I could not get the program to correctly "decompress" a stored picture. I believe I have located the "bug" and am sending this comment along for your consideration.

The bug manifests itself as an abbreviated pixel table in the storage area that is written to disk. Normally, all unique pixels are transposed from the pixel table in page 3 ($6000–$7CFF) to the storage area above the X and Y arrays ($8782 starting address). The transposition is accomplished with the MPT subroutine at $1D1A.

The variables XFROM and YFROM are the pixel source indices. XFROM is correctly compared to XCOL in line 478 to check for completion of the transfer of a full row of pixels. However, when YFROM is tested initially in line 481, it will always be 0 unless the branch at line 485 is not made. The effect is that the subroutine terminates prematurely.

My fix for the problem is to add "CMP YROW" between lines 480 and 481. In effect, this added comparison will insure that the subroutine will end only when the row and column indices match "synthesis" operation as described by Mr. So.

David G. Parker

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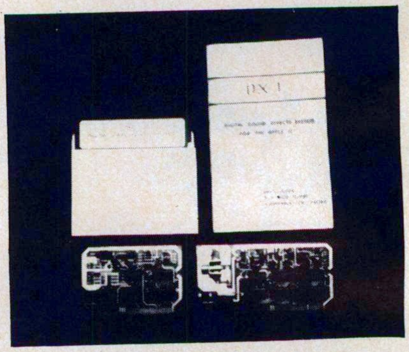

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Circle 9 on Reader Service Card

A **Call -A.P.P.L.E.** SOFTWARE REVIEW:

"I SING THE APPLE ELECTRIC"

William C. Dwyer/reviewer

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IT'S hard not to find something to like about Electric Duet. For the price of a simple game ($29.95 suggested list price), you actually get several interrelated programs. Mostly they do what the documentation says they will do and what they do is interesting and fun. Upon booting the system disk, the user is presented with a menu of three basic choices:

- Play Music
- Write Music
- Miscellaneous

One of the marks of good software is the inclusion of easily reached demos so that the excited new user can "get on with it" without benefit of documentation. The "Play Music" menu operation more than satisfies this criteria. Upon selecting "Play Music," you are offered two more choices — Jukebox or Piano. Selecting Jukebox gets you a second menu which lists 14 compositions in a "marquee" format with constantly moving characters as a border. A full title cursor is used to select compositions (a la Mitch Kapor and VISIPLOT). Entering return loads a song and plays it. The first surprise was the selection of compositions. Most are classical and quite long in duration, playing for several minutes. It was also thoughtful of the author to supply a command which cycles through all the demonstration pieces.

Of course, this is a music program and what you can hear is what really counts. What you hear from the Electric Duet Jukebox is very good. Each piece is complex and uses ED's flexibility in tonal range and note duration effectively. The six available "voices" can all be heard and the duet (or two simultaneous voices) effect is quite impressive. The method used to generate sounds doesn't press even the inadequate Apple speaker beyond its bounds. Many times in the past, particularly on games using musical interludes, I have heard more distortion and buzz than music. There is none of that here. The sound is relatively clean and crisp with an interesting "synthesizer" quality.

The second choice under "Play Music" is piano. Instead of the marquee and titles, the display is that of a piano keyboard which shows the correspondence between the Apple's character keys and notes on a piano. Here I had my first problems. There is no picture of this display (or any other) in the documentation. On my Apple many of the sharps in the display were shown to correspond to lower case alphabetic characters. The instructive text talked only about upper case alphabetic characters and the shift key had no effect. Fortunately, the tutorial in the documentation is a song played with upper case alphabetic characters and numbers. It turns out that the sharps are in fact played with numbers and special characters from the top row of the Apple keyboard. Spatially, they are in the right place. I suspect the display problem stems from use of the Ap–L–Case display chip. Nonetheless, this difficulty would have been much more easily overcome if the manual had a picture of the piano display.

Once I figured out where the keys were, the "piano" performed acceptably. By striking various Apple keys, one can get a feeling for the range of sounds available and play with the duet effect. I hesitate to say, however, that one could "play music." The sustain of each note is distressingly long, up to five seconds. Releasing the note, of course, has no effect since we are dealing with sampled binary switches. One can cut a note (all sound actually) short by striking the space bar. I found it hard, however, to adjust to the note, space, note, space . . . pattern.

The second choice on the Main Menu, "Write Music" is where all the software time and effort must have been placed. The "Write Music" part of Electric Duet includes two different but interacting music editors. The first editor allows the direct entry of notes by keying duration, octave and note. For example, the notation "8, 2A 8,3D" on an editor line indicates that two eighth notes (the "8") are to be played, the first being an A in the second octave and the second being a D in the third octave. Durations available range from whole notes to sixty fourths, including "dotted" notes (duration 50% greater than indicated duration number). Effectively, there are 4½ usable octaves. Rests and sharps are easily indicated and meaningless sharps (B#, E#) are diagnosed on entry. This editor also permits direct numeric entry instead of the "octave, note" format for special effects and custom notes.

The second way to get notes in is to enter "Piano" mode from the editor. Again a piano keyboard is displayed, but now notes keyed appear on the edit line with the carriage return used as a signal to move to the next edit line. This makes it much easier to enter notes, but does not allow complete entry of a composition since the keyboard has no way to signal duration. All notes appear in the edit file as the same duration, and it is necessary to go back in and manually re–enter correct durations.

"I SING THE APPLE ELECTRIC"

Once music is entered, various edit functions including insertion and deletion of a line and saving of files are available. There is also an exceptionally nice "transpose" function which allows easy tempo and key changes to be applied to all or part of a file. All necessary functions are available and all functions work as documented. A few seem unnecessarily cumbersome (such as the required confirm on opening or closing a file for deletion or insertion) but this is a minor criticism. Pieces can easily be debugged through a note trace function which allows the user to step through a piece.

The final function of Electric Duet is in many ways the best and most useful. By selecting "Miscellaneous" from the Main Menu, the user can generate a "player" driver allowing any composition to be played from within a BASIC program. Even commercial use is permitted as long as credit is given. This feature is well documented and easy to use. In my opinion, it adds tremendous value to the package.

In summary, although Electric Duet is not perfect, it is very good. It effectively provides a way to produce music with an appealing sound and complexity without the addition of hardware. One final caution for users without experience in entering music into a computer — note by note entry is very painful and time consuming. This is not a fault of Electric Duet, it is in the nature of any music complex enough to be interesting and is equally true of other, far more expensive systems such as the Mountain Hardware Music system.

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WHAT IN THE BLAISE IS GOING ON?

Bruce Van Norman/Pascal editor

THIS months column is about the adaptation of Apple U.C.S.D. 1.1 to the Apple *II*e. The prospect of a genuine keyboard is a heavy one. Unfortunately, the keyboard was not designed entirely with U.C.S.D. in mind. This and the accompanying articles, deal with adapting Apple's U.C.S.D. to eighty column displays (both the *II*e and][+) and with other matters unique to the *II*e.

The SETUP program (see pages 199 thru 209 of the Apple Pascal Operating System Reference Manual) is needed to adapt the operating system to the new keys of the *II*e. The up and down keys are not the old familiar CTRL "O" and "L." They are now CTRL "K" and "J." Unfortunately, CTRL "K" is used to generate a "[" (a BIOS characteristic). It is an awkward choice to make — especially for Pascal programmers — between a real up key and a "[" key. What follows is a Pascal description of what to modify in the Apple BIOS to make it all work correctly.

6502 Assembler

```
Set One (40 & 80 column displays):
   Up arrow. System.Apple, block 3, offset 421.
         replace:  A95B        -LDA     #{'['}
            with:  A90F        -LDA     #{up arrow} old
                                        familiar CTRL "O"

Set Two (80 column cards only):
   Down arrow. System.Apple, block 3, offset 409.
         replace:  AA          -TAX
                   AD1CBF      -LDA     CPCHAR
                   6A          -ROR     A
                   B037        -BCS     NOTFOLP2
                   8A          -TXA
            with:  C90A        -CMP     #{down arrow key}
                   D002        -BNE     *+4
                   A90C        -LDA     #{down arrow} old
                                        familiar CTRL "L"
                   EAEA        -NOP,    NOP
   Enable type-ahead. System.Apple, block 3, offset 393.
         replace:  F05E        -BEQ     JDONCK
            with:  EAEA        -NOP,    NOP
   Prevent type-ahead flush. System.Apple, block 4, off-
   set 206.
         replace:  C904        -CMP     #4
            with:  C903        -CMP     #3
   While we are at it, remove control A & Z screen pan
   controls for use with other software. System.Apple,
   block 3, offset 423.
         replace:  C901        -CMP     #{control A}
            with:  EAEA        -NOP,    NOP
   System.Apple, block 3, offset 441.
         replace:  C91A        -CMP     #{control Z}
            with:  EAEA        -NOP,    NOP
```

There are many ways to revise System.Apple. *Call -A.P.P.L.E.* In Depth Vol. 2 — All About Pascal — (page 73, Pascal Zap), provides a utility for this kind of work. The physical location of block 0 of System.Apple is determined by using the Filer's extended directory listing capability. This facility is described on page 59 of the Apple Pascal Operating System Reference Manual.

Pascal Version

```
program ModBios;
const
   A= 10: B= 11; C= 12; D= 13; E= 14; F= 15;
var
   I: Integer;
   F: File;
   Interpreter: packed array [0..31,0..511] of 0..255;
function Hex (Nybble1, Nybble2: Integer): Integer;
begin
   Hex = (16 * Nybble1) + Nybble2;
end;
begin
Reset (F. "#4:System.Apple");
I:= BlockRead (F, Interpreter, 32, 0);
      (* separates up key from "[" key *)
      (*make "up" key old familiar CTRL "O"*)
Interpreter [3, 422]:= Hex (0,F0;
      (* eighty column only! Restores old familiar CTRL
      "L" *)
      (* desirability is questionable, can use SETUP utility
      instead *)
Interpreter [3, 409]:= Hex (C,9);
Interpreter [3, 410]:= Hex (0,4);
Interpreter [3, 411]:= Hex (D,0);
Interpreter [3, 412]:= Hex (0,2);
Interpreter [3, 413]:= Hex (A,9);
Interpreter [3, 414]:= Hex (0,C);
Interpreter [3, 415]:= Hex (E,A);
Interpreter [3, 416]:= Hex (E,A);
      (* enable type-ahead with eighty column card *)
      (* Apple //e and ][+ *)
Interpreter [3, 393]:= Hex (E,A);
Interpreter [3, 394]:= Hex (E,A);
Interpreter [4, 207]:= Hex (0,3);
      (* cleaning up other control characters *)
      (* not required for any specific purpose *)
Interpreter [3, 423]:= Hex (E,A);
Interpreter [3, 424]:= Hex (E,A);
Interpreter [3, 441]:= Hex (E,A);
Interpreter [3, 442]:= Hex (E,A);

I:= BlockWrite (F, Interpreter, 32, 0);
Close (F);
end.
```

A related letter appears in this month's Write —A.P.P.L.E. . . . ed

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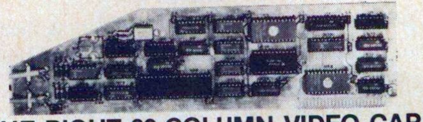

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SMARTERM*	360	No	No	Yes	Yes	Yes	Yes
VIDEOTERM*	345	Yes	Yes	No	No	No	No
SUP'R TERM*	375	No	Yes	No	Yes	No	Yes
OMNIVISION*	295	No	No	No	Yes	No	Yes
VISION 80*	375	Yes	Yes	Yes	Yes	Yes	Yes
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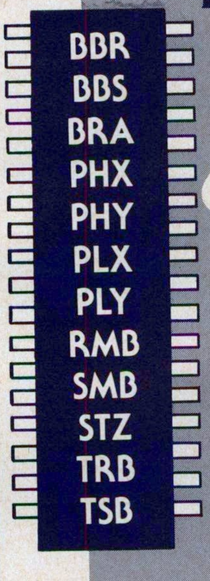

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Circle 32 on Reader Service Card

PASCAL MAGIC — A BETTER KEYPRESS

Joel Buckley and Ron DeGroat

KEYPRESS is a widely used Apple Pascal function that enables a program to test for keyboard input. Normally, KEYPRESS resides in the library unit APPLESTUFF. When a program "USES APPLESTUFF," two conditions occur: 1) The unit must be on-line and in the SYSTEM. LIBRARY. 2) All seven routines in the unit end up being linked and loaded. But in many cases, KEYPRESS is the only routine actually desired.

One way to avoid "using" the entire unit would be to write a separate assembly language routine for KEYPRESS. Such a routine appeared in the Winter 1980–81 issue of *Apple Orchard.* Unfortunately this solution introduces a couple of new hassles: 1) The KEYPRESS routine must be assembled separately (and most Pascal programmers tend to avoid assembly language whenever possible). 2) The EXTERNAL routine must be linked every time the host program is compiled (a process that is somewhat time consuming and cumbersome, especially on a single-drive system).

A Pascal implementation of KEYPRESS offers significant simplification because it can be compiled directly, requiring neither SYSTEM. LIBRARY nor SYSTEM.LINKER. It eliminates the unnecessary baggage of the unused routines in APPLESTUFF and also avoids the hassle of assembling and linking an EXTERNAL procedure.

The Pascal KEYPRESS routine shown in Listing #1 may be used in any Pascal program. It is version independent and should work for external consoles (unless serial interfaces or non-standard driver routines are used).

The KEYPRESS function forces the BIOS (Basic Input/Output System) to check the console for keyboard input by doing a WRITE with the flush flag set (see listing). Anytime an I/O operation is performed, the console device is checked. If a character is available, it is placed in the console type-ahead buffer. RPTR ($BF18) and WPTR ($BF19) are the buffer pointers to the last character read from the keyboard, and to the last character written to the system, respectively. If RPTR does not equal WPTR then characters are in the type-ahead buffer and KEYPRESS returns a value of TRUE, otherwise, KEYPRESS returns FALSE.

To directly access the necessary memory locations, KEYPRESS uses an invariant record called MAGIC. An invariant (free union) record is a variant record with no tag field. In general, invariant records should only be used in systems programming. "Now it's an INTEGER, now it's a pointer" is inconsistent with Pascal's straight-forward and easy-to-follow style. (For more information, see PROGRAMMING IN PASCAL by Peter Grogono, pp. 175–176.) In this case, however, the choice was between an EXTERNAL assembly language routine and an invariant record. Using MAGIC to access these locations seems justified because the addresses are permanently fixed (according to the Attach BIOS documentation from Apple). However, the user should not expect other memory locations to remain fixed in future releases of Apple Pascal. Except for hardware interfacing, use of invariant records and direct accessing of memory are generally poor programming practices.

Besides MAGIC, *another* trick is used in KEYPRESS which involves bit twiddling. The sixth bit of the CONFLAGS byte ($BF15) is the flush flag. The flush flag must be set so that the WRITE statement does not actually write anything (see listing). A SET OF 0.7 is represented by eight bit vectors in memory. The zeroth bit corresponds to the "0" in the set and the seventh bit corresponds to "7." Hence, a set, [2,6] is represented in memory by a byte with bit(2) and bit(6) set. It should be emphasized that this technique of bit twiddling is a special trick which should be avoided except under certain circumstances, e.g., hardware interfacing.

```
(********************************)
(*                              *)
(* LISTING #1: PASCAL KEYPRESS  *)
(*                              *)
(* WRITTEN BY                   *)
(*  JOEL BUCKLEY & RON DEGROAT  *)
(*                              *)
(* Call -A.P.P.L.E. : June 1983 *)
(*                              *)
(********************************)

PROGRAM KEYDEMO;

VAR COL : INTEGER;
    CH  : CHAR;


FUNCTION KEYPRESS:BOOLEAN;

TYPE BIT=0..7;
     BYTE=SET OF BITS;
     WORD=PACKED ARRAY[0..1] OF BYTE;

VAR MAGIC:RECORD CASE BOOLEAN OF
            TRUE: (ADDR:INTEGER);
            FALSE:(BYTE:^WORD);
          END;
    RPTR,WPTR,
    CONFLAGS:BYTE;
```

PASCAL MAGIC — A BETTER KEYPRESS

```
BEGIN

(* SET FLUSH FLAG TO DO NULL WRITE *)

  WITH MAGIC DO
   BEGIN
    ADDR:=-16619;          (*CONSOLE FLAGS *)
    CONFLAGS:=BYTE^[0];
    BYTE^[0]:=[6];         (*SET FLUSH FLAG*)
    WRITE(' ');            (*CHECK CONSOLE *)
    BYTE^[0]:=CONFLAGS;(*RESTORE FLAGS *)

    ADDR:=-16616;          (*BUFFER PTRS   *)
    RPTR:=BYTE^[0];
    WPTR:=BYTE^[1];
   END;

  KEYPRESS:=(RPTR<>WPTR);

END; (*KEYPRESS*)
```

```
BEGIN        (* KEY DEMO *)
  WRITELN('This program demonstrates KEYPRESS.');
  WRITELN('Press keys randomly, <ESC> to quit.');
  REPEAT
    FOR COL:=1 TO 30 DO
      BEGIN
        IF KEYPRESS THEN
          BEGIN                        (*CLEAR KEYBD *)
            READ(KEYBOARD,CH); (*WITH NO ECHO*)
            WRITE(CHR(7),'X');
          END
        ELSE WRITE('.');
      END;
    WRITELN;
  UNTIL CH = CHR(27); (* ESC *)
  WRITELN;
  WRITE('Demo complete, press <RET>.,);
  READLN;
END
```

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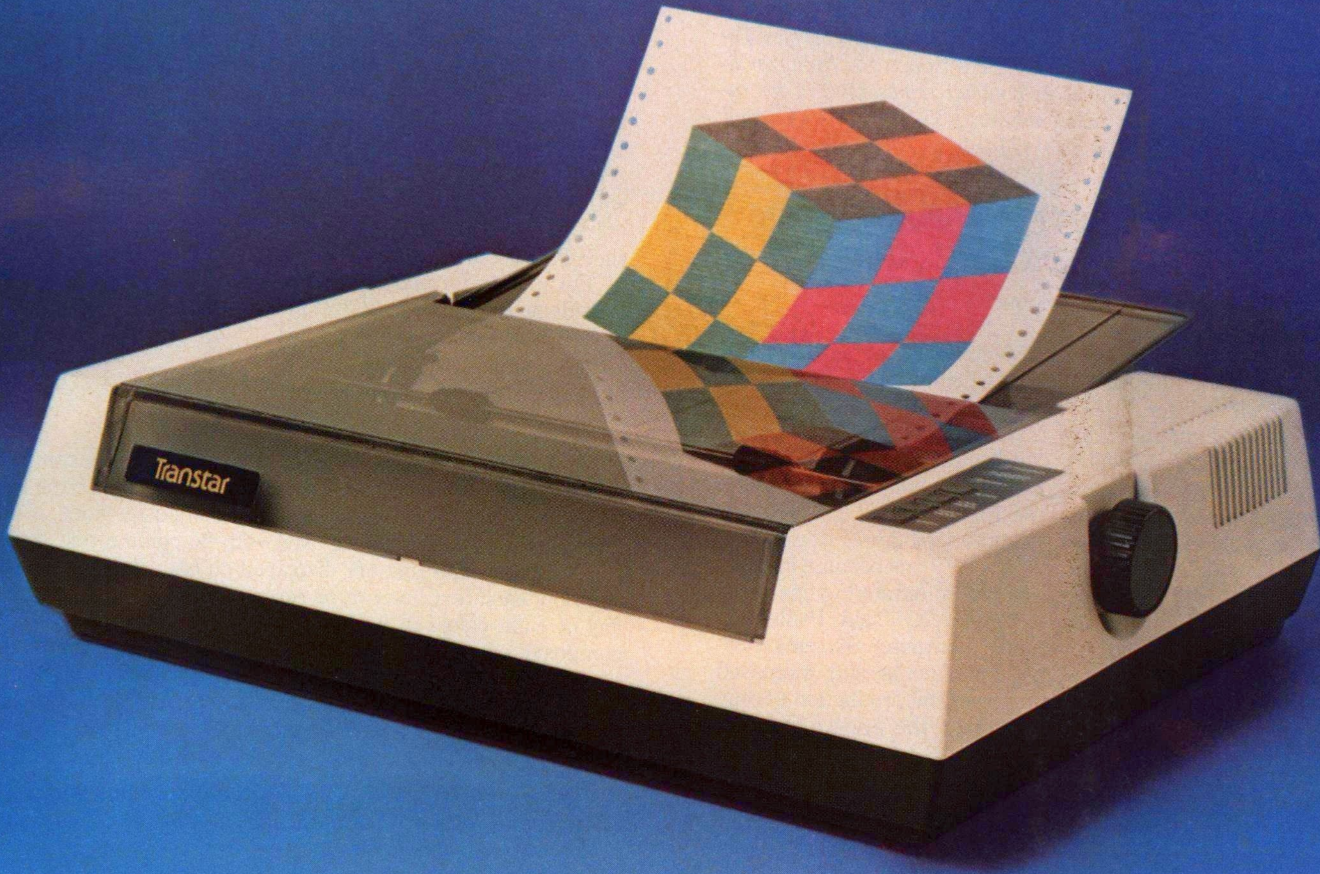
Circle 10 on Reader Service Card

WRITING THE WRONGS

the wrongdoers

```
]LIST

10  REM

    APPLESOFT "NEXT" DEMO
      BY WES HUNTRESS

CALL -A.P.P.L.E. : DEC. 1982

25  HOME : PRINT : PRINT "START":
      PRINT
30  FOR I = 1 TO 5
35  :: FOR J = 1 TO 10
40  :::: IF J = 5 THEN 55
45  :: NEXT
50  PRINT : PRINT "LINE 50"
55  NEXT
80  PRINT : PRINT "EXIT"
90  PRINT : PRINT "EXIT"
95  END
98  REM ***
99  REM

HOW MANY PRINTED LINES
DO YOU EXPECT?
TRY CHANGING LINE 45 TO
:: NEXT J, AND LINE 55
TO NEXT I. NOTICE
A DIFFERENCE?
```

Color for the Price of Black and White



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Circle 40 on Reader Service Card

TOMORROW'S APPLES TODAY

Kevin O. Donohoe/editor

NOTE: These products are presumed to be state of the art. Call -A.P.P.L.E. does not necessarily endorse nor test products published in this column nor guarantee their current availability

Editors Note: *In the March '83 issue, Tomorrow's Apples Today pointed interested readers of the* FFT Spectrum Analyzer *to Northwest Instrument Systems (a regional representative) for information rather than its manufacturer: IQS, Inc., 5719 Corsodi Napoli, Long Beach, CA 90803, (714) 973–1086. We apologize for the error.*

APPLE COMPUTER ANNOUNCES PRICE DROP FOR THE APPLE ///

Apple Computer today announced price reductions for its Apple /// personal computer. The U.S. suggested retail price of the Apple /// configured with 256 thousand bytes (256K) of main memory is now $2695, reduced from $3495. The 128K Apple /// will sell for $2495, reduced from $2995.

Apple also announced that it is discontinuing production of its 128K Apple /// and will drop it from the product line when current inventory is exhausted. Software and service for the system, as well as kits to upgrade 128K systems to 256K, will continue to be available through authorized Apple dealers.

"Application software for the Apple /// has become increasingly sophisticated and more highly integrated, generating greater demand for the 256K Apple ///," said Paul Dali, co-general manager of the Personal Computer Systems Division. Cost reductions on some components and increased manufacturing efficiency resulting from the production of only one configuration of the Apple /// make the price reductions possible.

The Apple /// personal computer is widely used in business, professional, and scientific applications.

Apple Computer, Inc., 20525 Mariani Avenue, Cupertino, CA 95014, (408) 973–2042.

NEW APPLE™ DETACHABLE KEYBOARD BY AMKEY

AMKEY, Inc. introduces the PRO–100 intelligent, detachable, capacitance keyboard with enclosure for use with the Apple][™/][+™ personal computers.

The PRO–100 offers 100 keys supporting all existing Apple functions plus: horizontal and vertical cursor movement, separate number pad with enter key, auto–repeat, relocated reset key, CAP's lock key, power– on indicator, upper/lower case (rev. 7+), 22 VisiCalc keys, 25 Apple BASIC keys, and 18 Programmable keys.

The VisiCalc keys assist the user to access all VisiCalc commands through the use of one key (VisiCalc function keys include: /SL, /SD, /SS, GOTO A1, /C, /B, /IR, /DC, /DR, /M, /F, /GF, /T, /W, /R, /S, #S, /S#L, /–, /E, /PF, /SQ, and also, full one key cursor control). This program reduces the user training time and creates a friendlier program for novices as well as dedicated programmers.

The Apple BASIC keys help the user to access BASIC commands that were normally confusing to remember or to use into one key function (Home, Catalog, Load, List, Edit, etc.) speeding up computer use. Supplied with the PRO–100 keyboard is a pre–boot diskette containing BASIC disk utilities, user friendly menu, keyboard information and a useful Word Processor and Graphics program that demonstrates the programming flexibility of the function keys. The detachable PRO–100 keyboard makes the Apple][/][+ a truly remarkable and user friendly computer.

Future options for the PRO–100 include: PASCAL, CP/M, FORTRAN, and other operating systems as well as popular word processing programs for the Apple][/][+ such as: WORDSTAR™, APPLE WRITER][™, and SUPER TEXT™ with function keys that can execute with the stroke of a single key. The PRO–100 keyboard package is compatible with existing Apple peripherals.

Amkey's PRO–100 keyboard package is available off–the–shelf for $265.00 including shipment and handling.

For more information contact: Mr. Robert Dimodana, Vice President, AMKEY, Inc., 220 Ballardvale Street, Wilmington, MA 01887 or call (617) 658–7800.

RGB COLOR BOARD, NEW FOR APPLE //e

A new video board that provides the Apple *II*e computer with RGB (red/green/blue) video signals that enhance the resolution and color quality of the supplied composite video, is now available. The board can be used with 80 column text so that color graphics and text are displayed on one RGB Monitor. In addition, each text line can be set to any one of eight colors on any of eight colors of background. SYNC signals are ± TTL composite or ± TTL separate horizontal and vertical, for universal RGB Monitor compatibility. The board plugs into slot #7 and comes with 5″ of ribbon cable for signal output. Optional cable connector and longer length cable is available.

Model VCB-2e	$169.00

Model VCB–A2, with VSS–80 RGB/80 column soft switch, is available for the Apple][.
Delivery is from stock

Telemax, Inc., 780 Lorraine Drive, Box 339, Warrington, PA 18976, (215) 343–3000

THE BEST OF FORTH DIMENSIONS WELL RECEIVED

The FORTH Interest Group (FIG) is pleased to announce the availability of *"The Best of FORTH Dimensions." The Best of FORTH Dimensions* was recently introduced at the 8th Annual West Coast Computer Faire (March 1983) and offers the computer consumer a quick and inexpensive ($1.00) look at *FORTH Dimensions* — the bimonthly (6/year) non–profit publication of the FORTH Interest Group. A one–year subscription to *FORTH Dimensions* is included in FIG membership of $15.00 USA and $27.00 Foreign.

The FORTH Interest Group is a worldwide organization of over 3,500 members devoted to the dissemination of information about the FORTH computer language. FORTH is an extensible, powerful, interactive, transportable and compact computer language. It can include an interpreter, compiler, assembler, operating system and editor. Implementations are available for micro, mini, and mainframe computers.

For further information call the FIG Hot Line (415) 962–8653 or write the FORTH Interest Group, P.O. Box 1105, San Carlos, CA 94070.

N-SQUARED INTRODUCES THREE STOCK MARKET ANALYSIS PROGRAMS

N-Squared Computing introduces three Interactive Graphics Market Analysis Programs for the financial Investor/Analyst. All programs are "User-Friendly" and incorporate menu-driven operations, superb graphics with auto-scaling, statistics, cursor with data readout, and optional "auto-modem" data base updating. Complete utilities for manual editing/updating and a comprehensive Instruction Manual are also included. Hardware requirements: Apple][+/*II*e, 48K RAM, Disk II, DOS 3.3. Optional: Modem, Print/Interface Card, Drive No. 2.

N-Squared Market Illustrator

The N-Squared Market Illustrator consists of two complementary programs for plotting, smoothing and comparing all types of financial data. One program features price, volume, and On-Balance Volume charting for stocks and commodities. The second program utilizes split-screen displays for comparing data with program generated indicators and includes a complete weekly Historical Data Base, comprising over 130 statistics compiled from BARRON's (from September 1980). $195.

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The N-Squared Market Analyzer provides the analyst with total manipulative capability to create and compare the most complex indicators (Data Base included). Keystroke functions include exponential smoothing, arithmetic averaging, ratios, sums, differences, transforms, de-trends, and time-lag analyses. Indicators such as the Trading Index (TRIN) and Advance Decline Line (ADL) are easily generated and displayed in seconds. $295.

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The N-Squared Stock Analyzer incorporates all major technical analysis functions for the detailed study of individual stocks. Capabilities include high-low-close-volume displays with linear or semi-log auto-scaling, price-volume indicators, relative strengths, momentums, smoothing, averaging, and Point & Figure charting. $295.

For more information contact: N-Squared Computing, 5318 Forest Ridge Rd., Silverton, OR 97381, (503) 873-5906.

SPEEDSTAT STATISTICAL ANALYSIS

SoftCorp International, Inc. has introduced two new Volumes of the speedSTAT statistical analysis system for Apple][computers. Volume 1: Frequencies & Crosstabs has been on the market for some time. It performs activity analysis and survey analysis functions, providing access to extensive descriptive statistics. The new volumes are Volume 2: Regression & Correlation and Volume 3: Analysis of Variance.

The speedSTAT line is designed to appeal to small business and professional users, including marketing professionals. All volumes are compatible with each other and with DIF files. Several more volumes in the speedSTAT series are under development and will be introduced with summer.

SpeedSTAT software is completely menu-driven. No previous computer experience is necessary. All volumes can be operated by a clerical person utilizing just five keys from the keyboard. The speedSTAT series produces presentation-quality reports and includes hands-on tutorials in the profusely illustrated User's Guide.

SoftCorp International, Inc. also provides toll-free technical support telephone numbers to assist the user.

The software requires an Apple][,][+, or *II*e with 48K and two disk drives.

SoftCorp International's corporate offices are located at 229 Huber Village Blvd., Westerville, OH 43081. Phone (800) 543-1350 (in Ohio, (513) 891-5044).

ADVERTISING AGENCY SOFTWARE PACKAGE

ADmaster II™, a total integrated advertising agency software package for use with the Apple][, *II*e, and IBM-PC computers is being offered by Bocek Associates, Inc. Industrial Advertising Agency of San Francisco.

In addition to conventional accounting records and reports, ADmaster II features Traffic Master which specifically deals with the numerous details involved with media placements. Separate files cover Future Media with provision for tracking and reporting various closing dates, Current Media for billing purposes, and Cumulative Media with details such as media invoice and payment check numbers.

ADmaster II is supplied with Master Control Program disks, a duplicate set of formatted working disks, printer programs, and complete documentation. Custom software to adopt the printing programs to each user's existing business forms is available.

Support and custom programming is available in person and by phone modem. Additional support will be available through the Admaster II Users Group which is now being formed.

Bocek Associates, Inc., 681 Market St., Suite 1022, San Francisco, CA 94105, (415) 543-4405.

BAT-STAT

Rainbow Computing, Inc. announces BAT-STAT, a program which keeps track of cumulative batting statistics for each player on a baseball team. This menu-driven program is designed to keep statistics for a baseball team of up to 20 players. Player statistics are given for both "This Game" and "Season." Team totals for current game and season are also provided on the report. Ten statistical categories are provided: At Bats, Runs, Hits, Batting Average, Doubles, Triples, Home Runs, Sacrifices, Walks, and Runs Batted In. BAT-STAT automatically computes batting averages.

BAT-STAT features: easy data entry and editing, error-handling, blank score sheet printing, and game and season report printing. Requires: Apple][+ 48K or Apple *II*e, and a single disk drive with DOS 3.3. The price is $49.95 on floppy diskette. For further information write RCI Marketing, 19517 Business Center Drive, Northridge, CA 91324, (213) 349-0300.

DISKINVOICE SYSTEM

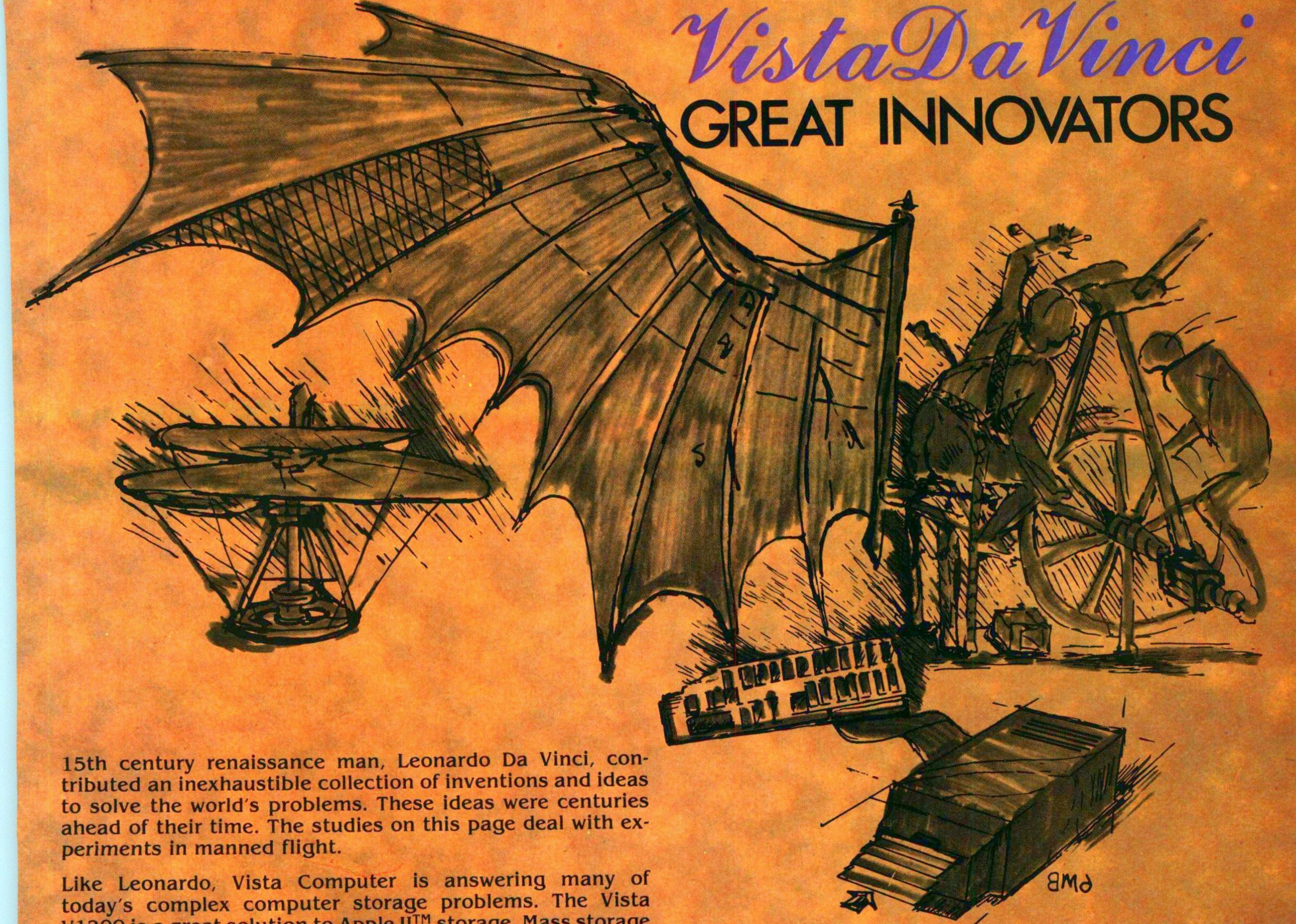
Broadway Software today announced the release of "DISKINVOICE SYSTEM," a software package for the Apple][,][+ and *II*e, designed to "break the price/performance barrier in small-business applications," according to W.L. Craig, Broadway Software's president.

"We have been pleased to see hardware prices dropping steadily," Craig says, "but are concerned that the opposite seems to be true in the software field, particularly in business and professional applications." Craig says he feels that a small business just can't justify five hundred or a thousand dollars for a lot of bells and whistles when all that's wanted is a fast, convenient way to type invoices, keep thorough records, and generate statements quickly and easily. "Our DISKINVOICE SYSTEM," he says, "will handle the billing for almost any business that sends out up to 300 invoices per month, and it retails for only $55.00!"

Broadway's new offering is a many-featured invoice/accounts receivable package which uses standard ASCII text files for data storage. All major elements of the system are written in Applesoft BASIC, to allow easy customizing and back-up, although customizing procedures to cover most situations are already built in. DISKINVOICE SYSTEM is also available in Spanish.

DISKINVOICE SYSTEM is completely menu-driven, and is available at several business-oriented software retailers or by mail from Broadway Software, 642 Amsterdam Ave., Suite 136, NYC 10025.

VistaDaVinci
GREAT INNOVATORS



15th century renaissance man, Leonardo Da Vinci, contributed an inexhaustible collection of inventions and ideas to solve the world's problems. These ideas were centuries ahead of their time. The studies on this page deal with experiments in manned flight.

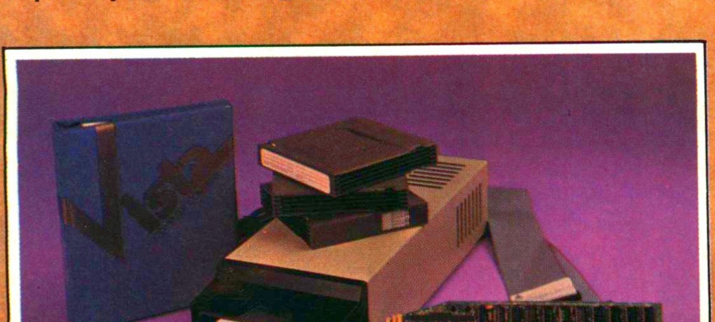
Like Leonardo, Vista Computer is answering many of today's complex computer storage problems. The Vista V1200 is a great solution to Apple II™ storage. Mass storage for your Apple II™ Computer has always been a problem. On one hand, there were the exotic, expensive hard disks with no cost efficient means of backup. On the other hand, the Apple floppy drive lacked the speed and storage demanded by today's professionals.

Vista's V1200 offers both at an incredibly attractive price. The removable VistaPak cartridges offer 6 Megebytes of removable storage each and can be backed up like a floppy.

Now hard disk storage and speed can be yours with the added capability of interchangeable media. The V1200 eliminates the worries of head crashes, drive alignments, lost data, or backup with a new application of field-proven floppy technology.

The VistaPak cartridges hold 6MB of formatted data each. The removable cartridge allows you to keep duplicates of your valuable data as well as to keep separate paks for your accounting, word processing, spread sheet and other applications. No other storage device offers more in flexibility and capability.

• Microprocessor controlled drive • DMA Controller • Removable Data Cartridges • CP/M, DOS & Pascal compatible • Quickcharge™, DOS enhancement included • Includes 1 VistaPak cartridge • Vista 120 Day Warranty



Vista V1200

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Circle 41 on Reader Service Card

TOMORROW'S APPLES TODAY

WORDSTAR ACQUIRES A VOICE IN NEW COURSE FROM FLIPTRACK

The leading word processor for microcomputers can now explain itself in friendly human terms, even to a first-time computer user.

Its voice is actually that of Lee McFadden, founder of FlipTrack Learning Systems, who patiently guides the word processing newcomer through each command and capability of WordStar. In three audio cassette lessons, requiring about two hours each, McFadden teaches his listeners to create their own documents, edit them, reorganize them, merge them, format them, save them and print them.

How to Use WordStar can be used with any computer that runs WordStar, including the IBM Personal Computer, specially equipped Apples and all CP/M-based machines.

In addition to three spoken voice cassettes, the course includes a fully-indexed User's Guide that summarizes all key ideas and procedures from the lessons. With the need for reading and note-taking eliminated, the learner is free to concentrate on the screen and keyboard, trying each command and seeing the results.

"The use of audio instruction for word processing training is certainly not new," McFadden said, "but our approach to it is. We don't assume that everybody has the same needs, interests and tolerance for practice, so we invite the learner to turn over the tape for additional topics and optional reinforcement at key points in each lesson. Our patented FlipTrack format works on any standard audio cassette player, and no computer hookup is required."

How to Use WordStar sells for $49.95 and is available through computer stores nationwide. For more information, write FlipTrack Learning Systems, A Division of Mosaic Media, Inc., 526 N. Main St., Box 711, Glen Ellyn, IL 60137, (312) 790-1117.

SOFTWARE PUBLISHING CORPORATION ANNOUNCES THE PFS® : SCHOOL RECORDKEEPER

A new software product designed to cut the paperwork burden in the school office will be available soon from Software Publishing Corporation.

The PFS:SCHOOL RECORDKEEPER works with the popular PFS:FILE and PFS:REPORT programs to produce over 30 reports for student record management; budget and requisition control; property management; and room and event scheduling.

The PFS:SCHOOL RECORDKEEPER consists of four ready-to-use forms. Each form design includes five to eight pre-defined report formats. Just enter the information in the form, then retrieve, update and sort it by any category. With a few keystrokes, it can produce the student lists, budget reports, equipment repair analyses, mailing labels and room/event schedules needed to keep a school running smoothly. Best of all, schools are not locked into a rigid software system. They can easily change the form designs and reports to meet their special needs.

The PFS:SCHOOL RECORDKEEPER will be available on the Apple][and *II*e in the spring of 1983. It can be purchased through selected educational suppliers or directly from Software Publishing Corporation. It sells for $150 or can be purchased with PFS:FILE and PFS:REPORT for $400.

Software Publishing Corporation is located at 1901 Landings Drive, Mountain View, CA 94043, (415) 962-8910.

THE ATTENDANCE DESK

DIGIPAC is pleased to announce the release of THE ATTENDANCE DESK, a software package for the Apple][computer. The program is designed to handle the attendance recording procedures of both large and small secondary and elementary schools. The program records up to five different absence categories as well as lates. It generates automatic notices to parents at selected numbers of absences. The program is also a comprehensive data base for schools recording pertinent information such as marks, comments, name, addresses and other school related demographic data.

Priced at $395 Canadian ($320 US) suggested retail, the program requires either an Apple][+ or Apple *II*e with 48K, two disk drives and printer.

DIGIPAC Computer Consulting, 907 River Street East, Prince Albert Saskatchewan S6V 0B3, (306) 764-1707.

APPLECENTER MODEL 12

The APPLECENTER Model 12 is designed to protect your Apple][system from theft and unauthorized use. Bolted to a table-top, the APPLECENTER protects your Apple][and two disk drives. Features include a built-in filtered cooling fan and the SURGE SENTRY voltage surge and spike protector from RKS Industries. The key switch powers-up your system and also unlocks the "hood" for easy access inside your Apple computer. Suggested retail is $239.95. Models available without fan or surge protection. Write to: Doss Industries, 1224 Mariposa Street, San Francisco, CA 94107, (415) 861-2223.

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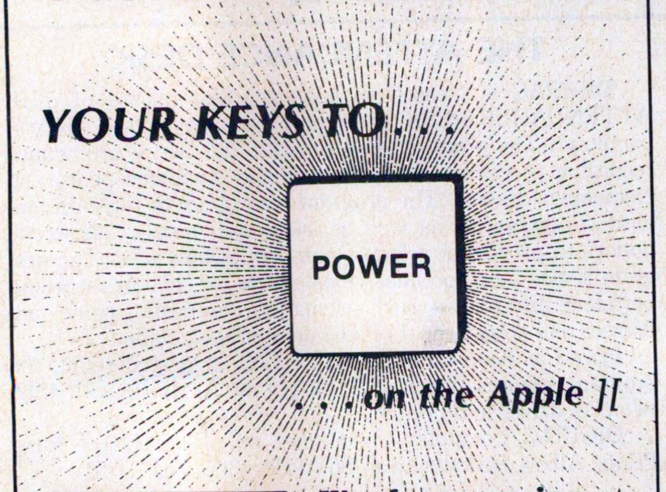

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Circle 19 on Reader Service Card

```
]PR#0
]LIST

10  REM

SO WHAT DID YOU EXPECT?

     KEN KASHMAREK

    CALL -A.P.P.L.E.

15  CALL  - 3102
20 PC =  - 3084: POKE 230,32: FOR
     I = 1 TO 5: READ A: DATA 42,
     85,127,170,213: GOSUB 940: NEXT

30  CALL  - 3112
40 P2 = 4 * 4096:L = 2 * 4096:P1 =
     L
50  POKE P2,127:A1 = P2:A2 = P2 +
     L - 2:A4 = A1 + 1: GOSUB 900

60  POKE P2,170: POKE P2 + 1,213:
     A1 = P2:A2 = P2 + 37:A4 = P2
      + 2: GOSUB 900:A2 = A2 + 2
70 B = 40:C = 128: FOR J = 0 TO 2
     :Z = P2 + J * B: FOR N = 0 TO
     7: FOR I = N TO N + 56 STEP
     8:A4 = Z + I * C: GOSUB 900:
      NEXT I,N,J
75  POKE P2,128:A1 = P2:A2 = P2 +
     L - 2:A4 = A1 + 1: GOSUB 900

80 A1 = P2 + L - 48: POKE A1,213:
     POKE A1 + 1,170:A2 = A1 + 3
     7:A4 = A1 + 2: GOSUB 900:A2 =
     A2 + 2
90  FOR J = 2 TO 0 STEP  - 1:Z =
     P2 + J * B: FOR N = 7 TO 0 STEP
      - 1: FOR I = N + 56 TO N STEP
      - 8:A4 = Z + I * C: GOSUB 9
     00: NEXT I,N,J
95  POKE P2,255:A1 = P2:A2 = P2 +
     L - 2:A4 = A1 + 1: GOSUB 900

100 P3 = P2 + L - 48
105 A1 = P2 + L - 48: POKE A1,85:
     POKE A1 + 1,42:A2 = A1 + 37
     :A4 = A1 + 2: GOSUB 900
107 C1 = A1:C2 = A2 + 2
110 A1 = P2: POKE A1,42: POKE A1 +
     1,85:A2 = A1 + 37:A4 = A1 +
     2: GOSUB 900
115 B1 = A1:B2 = A2 + 2
120  FOR J = 0 TO 2:Z = P2 + J *
     B:W = P3 - J * B: FOR N = 0 TO
     7: FOR I = N TO N + 56 STEP
     8
130 A1 = B1:A2 = B2:A4 = Z + I *
     C: GOSUB 900
140 A1 = C1:A2 = C2:A4 = W - I *
     C: GOSUB 900
150  NEXT I,N,J
890  END
900 T =  INT (A1 / 256): POKE 61,
     T: POKE 60,A1 - T * 256
910 T =  INT (A2 / 256): POKE 63,
     T: POKE 62,A2 - T * 256
920 T =  INT (A4 / 256): POKE 67,
     T: POKE 66,A4 - T * 256
930 X = 0:Y = 0:A = 0:PC =  - 468

940  POKE 69,A: POKE 70,X: POKE 7
     1,Y:GO = PC + 65536:T =  INT
     (GO / 256): POKE 59,T: POKE
     58,GO - T * 256: CALL  - 327
     : RETURN
```

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91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
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151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210

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C. ☐ Apple Compatible Floppy Disk
D. ☐ Computer
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F. ☐ Modem
G. ☐ CRT

2. More information on Apple PugetSound Program Library Exchange? A. ☐ Yes B. ☐ No

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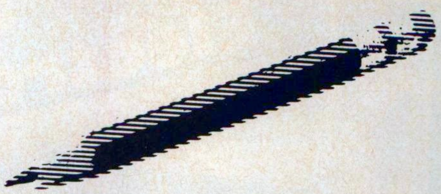

the readers

Watch Where You POKE

Dear Val,

I have just added the lower case patch to AppleWriter I (*Call -A.P.P.L.E.* Sept. '80). Many thanks to Sheila Widnall.

I have been searching for a patch to enable the AppleWriter to recognize the shift key modification. Certainly someone has done this. Please share it with me and the other club members.

The H. S. Bill Balsam article, *Delete That Incubus,* is one that would have saved hours of frustration for me a couple months ago. I had a mysterious bug apparently appearing at random in a large Applesoft program I was developing. Once every couple weeks a line would turn up garbaged. It never seemed to be the same line. The line would be garbaged and go undetected until after it had been shifted in memory by program modifications. This made it appear that a different location was at fault each time. After a few months of this, I realized that the "garbage" was a location set to zero. To make a long story short, I found a typo error in a POKE statement. I was using POKE -16368 to clear the keyboard of a key that may have been pushed before entry was requested. I had left the minus sign off. The error was in a section of code that was seldom executed and caused the garbaged line in an unrelated section.

Thomas De Winter
Rt. 2, Box 55
Colona, IL 61241

Routine Response

Dear Sir,

As the author of the Routine Machine, I was pleased to see a review of it in David Sparks' "Ampersand Utilities" (March 1983). I found David's observations on the Routine Machine to be generally fair and accurate, but I would like to clarify a few points.

The Routine Machine was designed to be a general purpose tool for incorporating machine language subroutines within an Applesoft program, provided that (1) the routine is relocatable, and (2) it is contained in a binary file on an S.D.S. disk. Routines may have any origin (write them yourself, if you like), and are not restricted to those available on the Routine Machine disk and the S.D.S. library disks. Thus the number and types of routines usable with the Routine Machine is unlimited.

It is true that, with the Routine Machine in memory (occupying $800–$25FF), an Applesoft program which uses High-Res Page 1 will crash in RUN. After appending modules to such a program it can be moved from its position at $2600 back to its usual position at $800 by either of the following methods: (1) With the Routine Machine disk in the current drive, BRUN REMOVE ROUTINE MACHINE. Or (2) SAVE the program (advised anyway), either "FP" (this resets the program start to $800), and RUN the program.

David raises the questions of what byte is in the accumulator, and where TXTPTR ($B8,B9) is pointing to, when an appended routine receives control. The first question is easily answered: The accumulator contains whatever byte TXTPTR is pointing to. To answer the second question three cases must be considered, depending on the type of "module" invocation: used:

(I) The module invocation has no parameter list, as in & "RESET BOOT." In this case TXTPTR will be pointing to the byte following the second quote, which will be either an end-of-line token $00 (if the module invocation is the last, or only, statement in the line) or an end-of-statement colon $3A (if not).

(II) The module invocation has a parameter list whose first character is a comma, as in & "SWAP", A1$, B2$. In this case the Interface Routine (which acts as an interface between the Applesoft program and its appended modules) will have gobbled the comma before passing control to the routine, and TXTPTR will be pointing to the first byte after the comma (in this example the byte would be $41, "A").

(III) The module invocation has a parameter list whose first character is not a comma, as in & "BAMBOOZLE"#7. This case is uncommon, but quite possible, and when the routine receives control TXTPTR will be pointing to the first byte after the second quote (in this example, $23, "#").

The fact that any initial comma in a parameter list is gobbled before the appended routine receives control is important to remember if you wish to use a routine obtained from a non-S.D.S. source, such as a magazine article. If such a routine has a JSR $DEBE (or in hex bytes: 20 BE DE) at its start then this should be removed (or patched over with NOPs: EA EA EA) before appending the routine using the Routine Machine. This is normally the only change that is required, provided that the routine is already relocatable.

The requirement that a routine be relocatable is not as great a limitation as might be supposed. For shorter routines, chained branches (or "stepping stones") can replace JMPs. In a longer routine (more than a few hundred bytes) this method is not feasible. In this case a technique can be employed which allows internal JMPs and JSRs without impairing the relocatability of the code. Readers interested in this technique should consult the Appendix to the documentation provided with my Amper-Sampler, one of the S.D.S. library disks. A slightly more general version of this technique is given in Apple Assembly Line, December 1982.

Peter Meyer
55 Sutter St.
Suite 608
San Francisco, CA 94104

REVIEWER SPARKS believes the additional information supplied by Peter Meyer is quite useful and should be added to the documentation, and the points well taken.

//e Escape Editing in 40 Column Mode

Call -A.P.P.L.E.

Information of possible use to the membership on the Apple *IIe*:

1) *Invoke active 40 mode with 80 col card.*

```
POKE        ; set CX00ROM
49159,0     Softswitch @ $C007

IN#3        ; or use PR#3
```

Result is steady, non-blinking cursor with 40 col. display. All ESC & CTRL codes work except those to set active 80 col and set active 40 col modes.

2) *Location 31 ($1F) is not available for unrestricted use by the programmer.*

Print PEEK (31) returns the horizontal location of the cursor at the point where the return key is pressed.

This prevents the Applesoft Line Editor A.L.E. (Nibble/Vol. 3/No. 5/1982) program from working. Location 29 appears to be unused.

Apple *IIe* documentation does not document this use of $1F.

R. L. Lietzke
216 Marsh Drive
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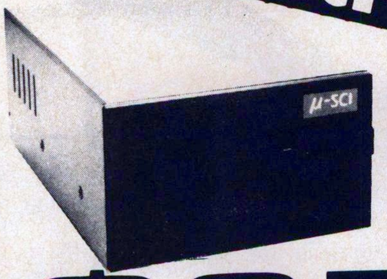

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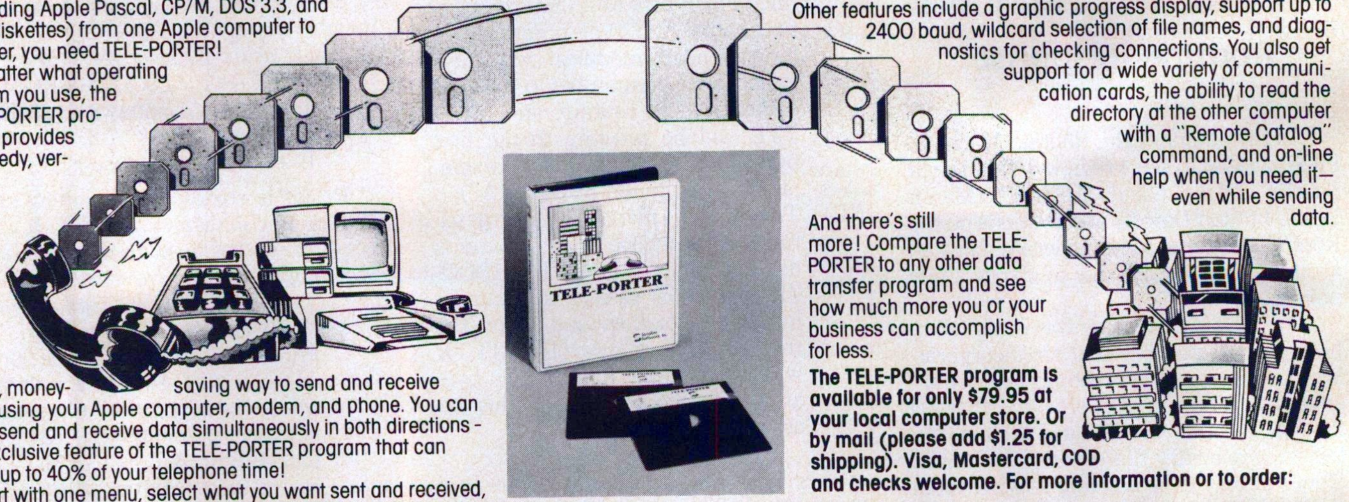

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WRITE A.P.P.L.E.

Booting //e Pascal

Dear Editor,

Apple did a commendable job of making the new Apple *IIe* compatible with existing software. However, there is a minor compatibility problem with one major software system — Apple Pascal 1.1. The problem arises when using the two disk boot sequence with a single drive. The current procedure is to power up with APPLE3: in the drive, switch to APPLE0: when the message "Insert boot disk with SYSTEM.PASCAL on it, then press RESET" appears, and then press RESET to complete the boot process. Pressing RESET is the problem. The Apple *II*, unlike the][+, clears the "language card" memory area whenever RESET is pressed. Unfortunately, that is exactly where the code required to complete the boot process is located. As a result, when RESET is pressed on the *IIe*, the boot process starts over from scratch and all you get is NO FILE SYSTEM.APPLE.

There is a solution to the problem, but it requires a patch to the program SYSTEM.APPLE on the APPLE3: disk. Listing 1 is a Pascal program which will accomplish the required patch. It replaces the RESET after switching disks with a RETURN (or any other key except RESET). The prompt is changed to "Insert boot disk with SYSTEM.PASCAL on it, then press (RET)." Instead of entering an endless loop waiting for RESET, the program checks the keyboard strobe until a key is pressed, clears the strobe, and transfers to the "RESET" location to complete the boot.

To apply the patch on a single drive system, compile the patch program and place the code file on a disk which contains SYSTEM.APPLE. Execute the patch program which will modify SYSTEM.APPLE with no visible output. If the modified SYSTEM.APPLE is not on APPLE3:, transfer it there. Then power up with APPLE3: in the drive, switch disks when prompted, and press RETURN. The boot process should then complete, resulting in the Command Line. As a precaution, make backup copies of all disks you are modifying before executing the patch program and don't attempt to patch the original master disks.

For those interested in how the patch works, I offer the following explanation. At the code location in SYSTEM.APPLE (which contains the Pascal BIOS) where the RESET vector is modified and the computer goes into an endless loop, I substituted code to check the keyboard strobe, clear it, and branch to the location to which the RESET was intended to branch. The instructions, added at $F3C3, are: LDA $C000, BPL $F3C3, STA $C010, LDA $C083, and JMP $D69E. The program also substitutes (RET) for RESET in the prompt.

Listing 1

```
PROGRAM MODBIOS;

  VAR
     BUFFER: PACKED ARRAY
     [0..31,0..511] OF 0..255;
     F: FILE;
     I: INTEGER;

  BEGIN
     RESET(F,"#4:SYSTEM.APPLE");
     I: = BLOCKREAD (F,BUFFER,32);
     CLOSE(F);
     BUFFER[17,105]: = 40;
     BUFFER[17,106]: = 82;
     BUFFER[17,107]: = 69;
     BUFFER[17,108]: = 84;
     BUFFER[17,109]: = 41;
     BUFFER[17,451]: = 173;
     BUFFER[17,452]: = 0;
     BUFFER[17,453]: = 192;
     BUFFER[17,454]: = 16;
     BUFFER[17,455]: = 251;
     BUFFER[17,456]: = 141;
     BUFFER[17,457]: = 16;
     BUFFER[17,458]: = 192;
     BUFFER[17,459]: = 173;
     BUFFER[17,460]: = 131;
     BUFFER[17,461]: = 192;
     BUFFER[17,462]: = 76;
     BUFFER[17,463]: = 158;
     BUFFER[17,464]: = 214;
     RESET(F,"#4:SYSTEM.APPLE");
     I: = BLOCKWRITE(F,BUFFER,32);
     CLOSE(F)
  END.
```

William G. Wright
4591 Jamboree Street
Oceanside, CA 92056

Round Numbers

Dear Val,

In the December issue of *Call -A.P.P.L.E.* on page 39, Michael Thyng showed one way to beat the rounding problems that are unavoidable with floating point numbering systems. The following method has served well and has the advantages of speed and simplicity.

```
10 A = 1
20 PRINT A
30 A = A + .01
40 A = INT (A * 100 + .5) / 100
90 GOTO 20
```

Line 40 above replaces 40 thru 80 in Mr. Thyng's article. Replace the "100"s with the appropriate number for however many decimal places you desire. (i.e. 1000 for three places).

Brian D. Silverio
7 Clark Street
Danvers, MA 01923

GPLE Patch

Dear Editor

In the February '83 issue, Dr. Miller wrote about problems with GPLE and the Apple Cat Modem. As I had had the same problem, the letter was of much interest to me. After some experimenting, I came up with a solution to the problem Dr. Miller described. Following is a hex dump of the required code. If you BRUN it before installing GPLE, everything works fine.

I hope this is of use to other Apple Cat Owners.

```
MONCIO
CALL -151
0300: A0 20 A9 00 99 82 C0 A9
0308: 01 99 81 C0 A9 0F 99 83
0310: C0 A9 1F 99 8D C0 60
3D0G

START ADDRESS = 768
LENGTH = 23

Disposition:REPLY

Enter text:
```

Bob French
Henderson, NV

Forth Trace

Dear Val,

Regarding the corrected listing of my Stack and Status Trace screen, I appreciate the difficulty of correctly reproducing FORTH listings. You asked about wrapping line 4 into a definition: That would be unnecessary since "CONSTANT" creates the needed definition. The prior words on the line simply specify the value for the constant named "OLDCFA." There is another error that you could correct. In line 22 of the article proper, the phrase:

```
HEX 'QUIT 10 + @ 2 + NFA ID.
```

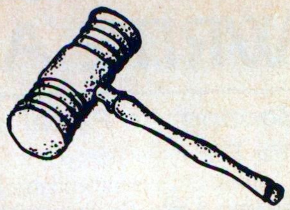
should have had a space between the tick and "quit" like this:

```
HEX ' QUIT 10 + @ 2 + NFA ID.
```

Most likely anyone who tried could figure out the problem, but printing this correction might help a few folks.

Guy Grotke
3515-B Monair Drive
San Diego, CA 92117

A.P.P.L.E. MEETING MINUTES



Dave Lingwood/secretary

FEBRUARY 15, 1983
Seattle University

Annual Meeting

PRESIDENT Dick Hubert called the Annual meeting to order at 7:42PM. There were 66 members present.

Old Business: The minutes of the 1982 Annual Meeting were read, and approved as published in the April, '82 *Call -A.P.P.L.E.*.

Election of Officers: Ted Butler, Tellers Committee chair, read the results of the election. Ballots were tallied by optical card reader. Here is that report:

Election Results February 15, 1983
1531 ballots were counted.

237 envelopes containing ballots were invalidated, usually because they did not follow instructions.

Sample checks of valid membership numbers showed no discrepancies. Hand counts of sample batches were used to check the card reader.

Ballot tallies were:

President: Dick Hubert 1394, None 1, D. Lingwood 1

Vice President: Bob Huelsdonk 1391, None 1, V. Golding 1

Secretary: D. Lingwood 1406, None 1, D. Hubert 1

Treasurer: Bob Clardy 1372, None 1, D. Hubert 1

Directors (two to be chosen):

Don Williams 993, Ken Smith 887, M. Develle 846, Others 2

Ted Butler, Tellers Committee

New Business: President Hubert gave his annual state of the club report:

Membership now stands at over 15,000 active members. Club offices have just moved to the new space in Kent (where our next meeting — an open house — will be held). This gives us a five-fold space increase (20K square feet), and room for classroom, meeting, and library space.

We introduced our line of hardware products in '82: half of our 38 new products were hardware, producing a major share of our income — hardware was introduced as a result of the overwhelming support for this in our survey of club members. Our pricing can, because of our growth and membership size, approach dealer cost.

We have four new products: the Prowriter printer, Vista V1200 6mb drive, USI 9″ green monitor, and THE Spreadsheet, V2.0. The latter supports 70 or 80 column display, up to 512K of RAM, at a cost under $60.

The Editorial office is now open in West Seattle, adding 1½ staff persons. The main office now has 25 staffers, most full time. We've recently added seven technical support people for product evaluation and development, including full-time hotline coverage during office hours.

An IBM System 38 computer is on order. This will let us automate member records and order entry, and cut the order turn-around time. This is important because order turn around slipped from two weeks to nearly four by December. Also, orders outstripped our ordering projections on some hardware items (e.g., we ordered 100 fans, and got orders for 500!).

Not to be outdone, Bob Clardy gave the following *Treasurer's Report*: Our income for '82 was $2,157,262, and expenses totaled $1,975,315. There was a steady growth in both figures over the year. Hardware sales totaled, by December, ⅔ of our income. We are averaging about 600 new members per month.

The official actions of the Board of Directors on behalf of the club during 1982 were approved.

It was also decided to publish in *Call -A.P.P.L.E.* a map showing the location of the club office, and other sites at which meetings might be held.

There followed a Q & A session on club business. Here are the highlights: We will try to eliminate the old policy requiring 24 hour advance call in for orders to be picked up at the office. Also, the library will contain a copy machine, and our reference collection of magazines from other clubs. We should try to link to publishers to get library texts. We're trying to get a 1,200 baud modem for our hardware product line, at a price around $300. We plan to hire an educational projects coordinator soon to tackle issues such as the computer camp, accreditation for courses, etc. We also hope to increase contacts with other clubs in the area.

The meeting was adjourned at 8:40PM.

Q & A: Several members were interested in downloading of CP/M files from 8″ to 5″ disks. The Boeing Computer Club will offer a system that does this.

There was a plug for our involvement in the upcoming Applefest II at the Pacific Science Center.

Is *II*e DOS any faster? Well, no: it is good ol' 3.3. Loading of the language card is a bit different, though: the *II*e loads $B000—$F800, then copies the ROM monitor to RAM.

Speaker: Jeff Wollen, Jeff Hack and John Smith of Alpha Syntauri demonstrated their music system. It is a keyboard and software that makes use of the Mountain Computer music boards. Goodies include: creation of new sounds through additive synthesis, multi-voice 16 track digital record/play/play while recording, Music-Master CAI in basic music theory, printout of the score via dot matrix printer. Ten disks come with the system. One contains 120 pre-set instrument sounds. There is even a built-in metronome.

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A.P.P.L.E. MEETING MINUTES

MARCH 15, 1983
A.P.P.L.E. Offices, Kent

Open House and Duck Stampede

Secretary's Preface: what can you say? 400 people roaming around, craning their necks up at the lofty heights of the new offices, a grain field of waving arms holding money and discounted products in the jury-rigged retail area, Jonathan Post proving to be his own best organic computer as inaugural speaker, Lisa. A computational zoo with punch and cookies. The minutes below thus threaten to become as hectic as the hours of the open house itself. So, let me get the official report out of the way.

President Dick Hubert called the meeting into minimal semblance of order at 7:33PM. There were 200 members and guests packed into the meeting room, and at least 200 others wandering about elsewhere.

Old Business: None.

New Business: Bob Clardy gave his Treasurer's Report: As a result of the move and its expenses, February showed $163K income, and $300K expenses.

Dick Hubert noted that our phones got very messed up during the move, but that all lines are now working. Our "Store" will soon be open on a regular basis — watch *Call -A.P.P.L.E.* for an announcement.

The meeting was adjourned at 7:35PM — a new modern record, and tribute to the other enticements of the evening.

Speaker: Jonathan Post sees no reason computers ought to be made from unfeeling silicon — why not give organic molecules equal time? Silicon and copper limit the size and complexity of computers. If you work at the organic molecular level, all this goes away, and you find yourself working with concepts such as protein monolayers and the beaming of metal paths on them.

If you expect me to present a complete discussion of this line of reasoning, forget it. It is enough to note that in the medium future we may look back on silicon ICs with the same feeling of quaint arcanery that today we reserve to diode vacuum tubes. Don't, however, look for an organic computer plug in for your Apple, though. For one thing, while the concepts for organic computer chips are there, nobody's figured out how to hook up I/O!

The Open House:

Fun time, ladies and gents. Step right up . . . OUCH, that was my foot! Lord, is this place big, and that's (literally) only the half of it — the hanger (er..) warehouse is closed for the night; just the front half, though, has over 10K square feet. Remember when we moved into the couple of rooms of the first office, and wondered if we'd ever fill it up? No, that's not the restroom line-up; those are folks waiting to get in for the Lisa demo. Everyone walking in with a potted plant to donate to fill up the "moat" around the conference room — the technological equivalent of Burnham Wood (we *do* want to get the joker who brought the potted dandelion). Office staff becoming multi-phrenic, trying to be everywhere at once (and pulling it off).

Random impressions of a boggling event. We sometimes think that much of the industry looks at user's groups with eyes that developed observational cataracts in 1979 — back then we *were* hackers and tinkerers. The micro world has changed, and so have we grown with it. The Open House testified to this growth: the course sign-up sheets on the wall showed strong interest in spreadsheets and applications instruction, for example. There are two ways to go — one toward a "business" of running the club, the other toward even wider member participation. I hope these new facilities will provide the large, fertile hothouse in which the participation will flourish. With all the possibilities the space opens up, Heaven knows we'll need all the member participation we can get.

Down from the wall a bit, the Open House was packed by six PM, and didn't start to taper off until well after nine. The staff had transformed our soon-to-be library into a sales area, showing off all the hardware and software. A lot of people came to buy. Guided tours led chunks of the throng through the staff office areas, past the already full Lisa demo, and back out to the classroom.

The latter is impressive: it will hold over 200 when the two dividing walls are pulled back. With them shut the space becomes three class rooms, each with space for machines. The "public" classroom, library and sales spaces are in one area, making it easy to run events and classes without messing up the office staff work area.

In the back there is about 10K square feet of warehouse. Most of us never really saw all of that stuff before — it was scattered around in miniwarehouses. All together it is a jolting reminder of just how productive a clan we are. There are stacks of our publications of all stripes, pallets of hardware and software, etc.

Steve Johnson's technical staff finally have work space. Even in a new building, though, it is amazing how hardware obeys Parkinson's law (and usually Murphy's) by filling all available space. The staff are testing hardware, repairing equipment, evaluating software, writing documentation, and (one) camping on the hotline during the day. A lot of this didn't really show at the Open House, nor did the people-fullness of the place during business hours, when our 20+ staff members are cranking out orders, answering the phones, and generally trying to keep their heads above water.

An amazing facility. Dick and the planners did a good job. You really ought to stop by if you missed this event, and let your imagination run wild in helping us figure out all the valuable things we can do in this space. We need you.

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10	12	2.32	3.53	4.72
12	14	2.58	3.98	5.38
14	16	2.84	4.44	6.04
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1) One Apple][plus 48K with an Apple language card, an Apple Super Serial card, a Videx "Video Term" 80 column card with soft video switch and a Kensington "System Saver" fan. Apple serial number 513379.
2) Two Apple Disk II drives with controller. Apple serial numbers 798088 and 377867.
3) One Apple Silentype printer with controller. Apple serial number 63201.
4) One Apple /// Monitor. Apple serial number 120722.
5) One Epson MX-80 printer with NO controller. Serial number 334783.

The Apple, the Silentype, and the MX-80 all had State of Texas property tags affixed. If the tags were removed, there should be some damage to the finish. If the equipment comes to your attention, please notify one of the following: Bill Nash - 118 E. Riverside Dr., Austin, Texas 78704 (512) 445-8325. John Davis -118 E. Riverside Dr., Austin, Texas 78704 (512) 445-8334. John Ribble - 118 E. Riverside Dr., Austin, Texas 78704 (512) 445-8370. Any assistance you can provide us in locating the equipment will be appreciated.

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STOLEN APPLE][PLUS SYSTEM. Please be on the lookout for an Apple][Plus (S/N 519969), two RANA Elite 1 Disk Drives w/ controller (S/N EIE 4018 and EIE 4020), BMC Model BM212A CRT 12" Monitor (S/N 62408273), Microline Model 82A 80-column Printer, as well as Microsoft Z80 card, Vista Vision 80-Column Card, and Saturn 128K RAM Card. The system is stolen government property, taken over the weekend of 9-10 April 1983 in Bremerton, Washington. Anyone with information, please contact Doug Stillman (206) 396-4426.

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(continued on page 55)

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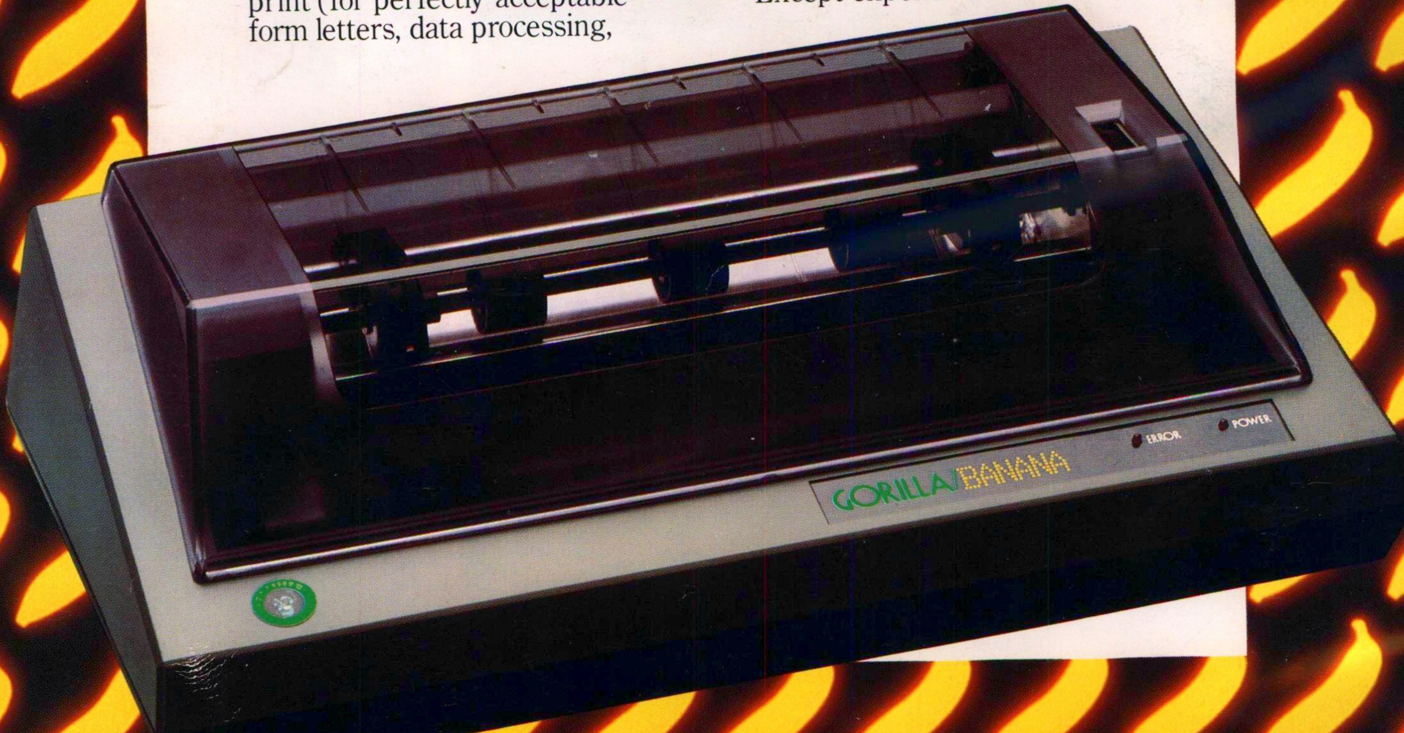

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